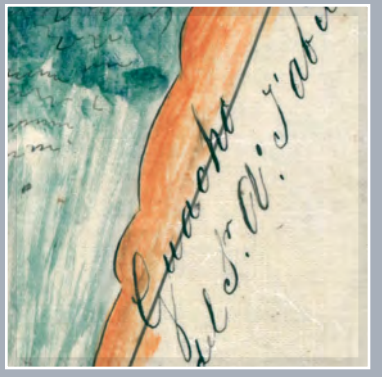
HISTORICAL ECOLOGY OF THE

# Ballona Creek Watershed

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# EXECUTIVE SUMMARY

Looking across the vast urbanized landscape in the Los Angeles Basin, it is almost impossible to imagine the natural landscape prior to human development. The remaining wetlands leave only a few clues about the past wetland complexes in this region. Nevertheless, the past is vital to understanding the foundation of landscape-processes, historical wetland distribution, and human impact that lend to a better understanding of sustainable restoration plans within the constraints of the contemporary landscape.

The primary goal of this project was to identify the characteristics of historical wetland habitat types and describe the historical form of major creeks in the Ballona Creek watershed. Our target time period was 1850-1890, just prior to contemporary impacts but after the migration of the Los Angeles River, which fundamentally altered the hydrology and morphology of the watershed. It is also a time period that is relatively data rich associated with information compiled around the time of statehood. We set forth to answer the following questions:

1. What was the extent (acreage) of persistent riparian, wetland, and associated floodplain habitat in the Ballona waterhshed?
2. What were the predominant types of wetlands in the watershed and what was the spatial distribution of these wetlands within the watershed?
3. What potential resources are available for stakeholders and scientists wanting to pursue further and more detailed research on this watershed?

Conclusions about historical wetland composition, extent, and distribution were based on a "weight of evidence" approach. Over 300 documents were compiled from 84 source institutions and organized through a metadata catalogue. Data sources were digitized, georeferenced, and organized by subregions within the study area. Spatially referenced datasets were overlaid and augmented by textual citations, photographs and other non-geospatial data. The concordance between multiple data sources allowed us to draw conclusions that supported inferences about historical conditions. We assigned a certainty rating for interpretation, shape/size, and location of each polygon mapped based on the number and quality of corroborating pieces of evidence. Finally, historical herbaria records and bird observations were used to provide insight into the composition of historical plant communities.

### Extent and Type of Wetlands in the Ballona Watershed

The Ballona watershed supported a great diversity of wetlands during the mid-late 19th century (figure es-1). The La Cienega wetlands and the Ballona Lagoon complex accounted for the majority of wetland area in the watershed. Various freshwater ponds, vernal pools, wet meadows, freshwater marshes and numerous springs were found throughout the watershed. We mapped 174 unique wetland polygon features comprising 14,149 acres. The dominant wetland types included alkali meadow (35%), valley freshwater wet meadow (10%), valley freshwater marsh (10%), brackish to salt marsh/tidal marsh (9%), and alkali flats (8%; table es-1).

| HABITAT CLASSIFICATION | UNIQUE WETLANDS | ACRES | HECTARES |
|---|---|---|---|
| ALKALI FLAT | 5 | 1284 | 486 |
| ALKALI MEADOW | 21 | 5273 | 1915 |
| BEACH | 2 | 159 | 64 |
| DUNE | 8 | 187 | 76 |
| OPEN WATER* | 8 | 96 | 39 |
| PERENNIAL FRESHWATER POND | 8 | 110 | 45 |
| SALT FLAT/TIDAL FLAT | 15 | 423 | 171 |
| SALT MARSH/TIDAL MARSH | 20 | 1240 | 498 |
| VALLEY FRESHWATER MARSH | 35 | 1356 | 547 |
| VERNAL POOL | 15 | 260 | 105 |
| WET MEADOW | 24 | 3336 | 1351 |
| WILLOW THICKET | 13 | 425 | 173 |
| TOTALS | 174 | 14149 | 5470 |

*DOES NOT INCLUDE PACIFIC OCEAN

***TABLE ES-1:***
*Summary of wetlands mapped on the Ballona Historical Ecology project.*

We mapped 232 miles (373 km) of historical stream channels in the study area. Approximately 80% of the stream channels were intermittent (often discontinuous) washes. Across the valley floor most of the streams sank into porous soils or spread into the major wetland complexes of La Cienega and the Ballona Lagoon. This characteristic likely contributed to a significant amount of subsurface water flow and to the vast wetland complex at La Cienega. The exceptions were Ballona and Centinela Creeks, which were perennial streams lined with willow woodlands. Both streams provided freshwater input to coastal wetlands of Ballona Lagoon.

Freshwater seeps and springs were a characteristic feature of the Ballona Watershed. Although springs were present at a few locations throughout the Ballona Valley, 70% of the 45 mapped springs in the watershed were found in the Santa Monica Mountain foothills. These springs were clustered in the foothills and stopped abruptly at Franklin Canyon. This distribution could be the result of fault displacement or geologic composition. These springs played a notable role in downstream hydrology, where in several locations freshwater wetlands formed at their confluence (particularly in Rodeos de las Aguas near present day Beverly Hills). Many of these springs persist today and are unique remnant features from the historical landscape.

### Data Products

In addition to this summary report, we developed several products designed to make the data compiled through this effort more readily available for exploration and use. Once collected, photographs, maps, and textual data were uploaded into an online metadata catalog. The catalog provides a means to organize and query historical documentation by spatial location, wetland descriptions, time period, and source. Bibliographic tables and information about source institutions may also be downloaded from this online database creating a secondary product for stakeholder use. This type of database creates a dynamic tool for the discovery of new information and allows for the creation of different hypothetical questions that can be explored by future researchers. The metadata catalogue, an associated geodatabase with spatially explicit data, raw data tables, and this summary report can be viewed and downloaded from **www.ballonahe.org**.

The contemporary Ballona watershed represents unique opportunities for restoration planning. The information in this report should provide a foundation for understanding the functional relationships of the various wetland complexes, lend support to the development of sustainable restoration plans, and facilitate consideration of natural landscapes into future planning for infrastructure and stormwater management.

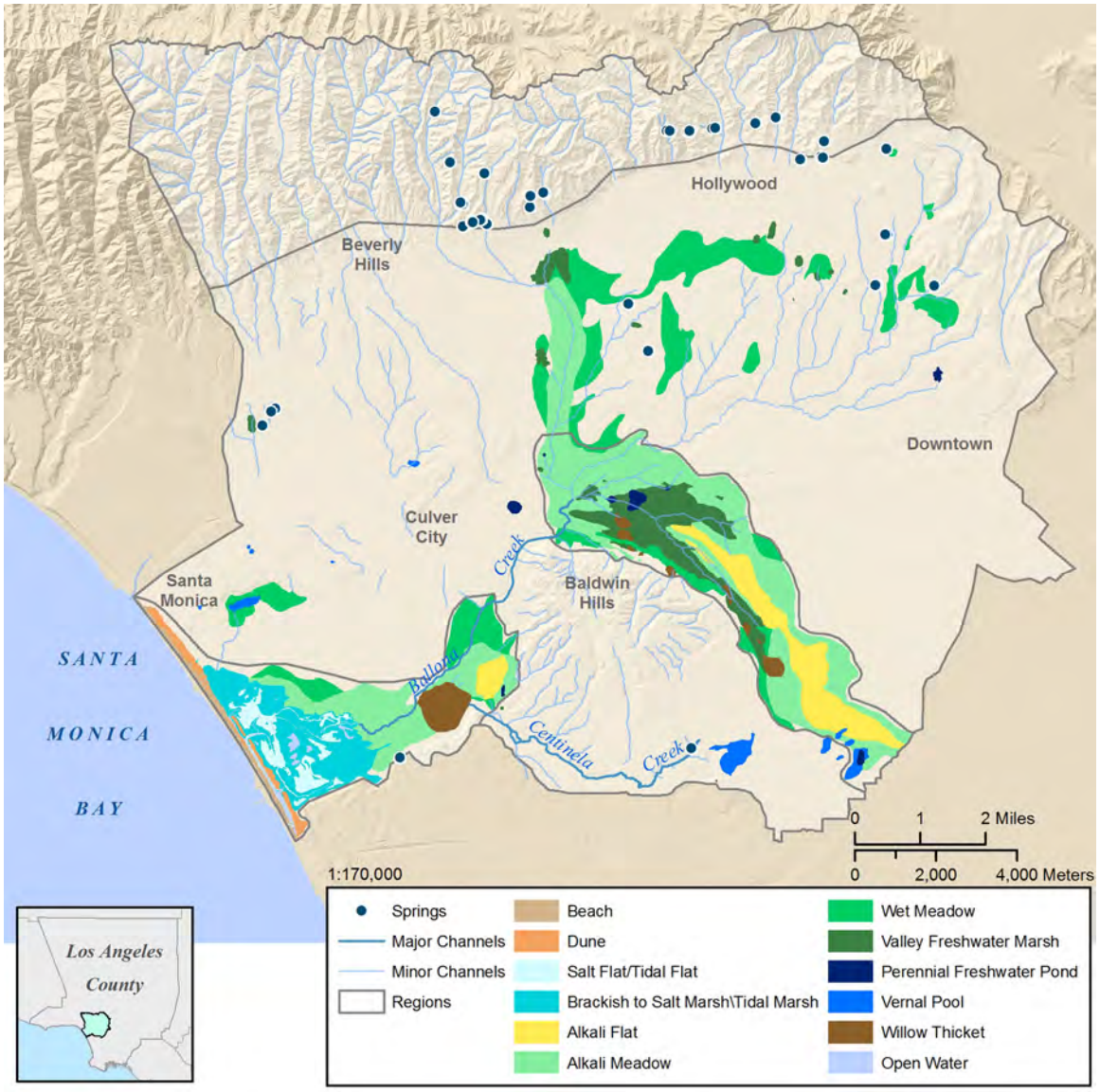


**FIGURE ES-1:** *Distribution of wetlands and associated features within the Ballona Watershed (1850–1890).*

## INTRODUCTION

*"Restoring the Ballona Creek watershed is a waste of time and money."* Such commonly heard sentiments about highly urbanized watersheds used to be commonplace. Studies in California and other regions have shown that where underlying watershed processes remain intact, restoration options exist, even in highly urbanized settings (Zedler and Leach 1998, Ehrenfeld 2000). Historical ecology provides an understanding of how landscape-scale processes influence wetland extant and distribution under more natural conditions; thus it provides context for restoration planning by providing insight to natural ecosystem functions. (Kentula 1997, Kershner 1997, NRC 2001, White and Fennessy 2005, Kentula 2007).

The on-going planning efforts associated with the Ballona watershed can benefit from the insights of historical ecology. While the Ballona watershed is highly urbanized, it retains remnants of its historical natural resources mainly in the form of coastal wetlands and natural springs. Developing an understanding of potential restoration options in such landscapes depends upon a sound understanding of both contemporary conditions and historical ecological wetland functions. The historical perspective provides an understanding of the relationship between physical settings that support natural wetland functions, the driving forces behind ecosystem degradation and perhaps most importantly, the value of wetland ecosystems that remain intact (Stein et al. 2010). Our goal is to provide this unique perspective of the Ballona Watershed as a valuable tool for understanding not only the past, but for assessing present and future options for management and restoration.

Knowing the historical ecosystem processes associated with the Ballona watershed will provide insight into larger ecosystem processes that governed the greater Los Angeles/San Gabriel river basin. Previous historical ecological research on the San Gabriel River suggests that ecosystem processes were more dynamic and wetlands more diverse than previously expected (Stein et al. 2007). This sheds light on only one component of a larger interconnected system of rivers and wetland complexes, all tied together at some point in time by the Los Angeles River. This report provides information on one additional component of this system, accentuating the importance of historical research on the Los Angeles River to capture a more comprehensive understanding of inter-relatedness and unique qualities of Southern California wetland ecosystems.

## PROJECT OBJECTIVES

The primary goal of this project was to identify the characteristics of historical wetland habitat types and describe the historical form of major creeks in the Ballona Creek watershed. To achieve this goal, we created a habitat map and comprehensive dataset describing the extent of creeks and diversity of habitats throughout the watershed. The target time period was prior to significant Euro-American modification (including the Spanish-Mexican ranching era) and just after the natural realignment of the Los Angeles River in 1825 from the Los Angeles Basin to the San Gabriel Valley. Specifically, we used historical ecological research to answer the following questions about the Ballona watershed:

1. What was the extent (acreage) of persistent riparian, wetland, and associated floodplain habitat in the Ballona waterhshed?
2. What were the predominant types of wetlands in the watershed and what was the spatial distribution of these wetlands within the watershed?
3. What potential resources are available for stakeholders and scientists wanting to pursue further and more detailed research on this watershed?

### Data Products Available

In answering the above questions, we developed a geodatabase with spatially explicit data. This geodatabase can be used to identify the location and classification of historical habitat types. We also developed a web-portal for visualizing the historical distribution of wetlands relative to the contemporary environment, this executive summary report, and a series of tables that will provide resources to those wanting to pursue more detailed research of specific wetlands or specific time periods not examined for this project. These data sets can be viewed and downloaded from **www.ballonahe.org**. TABLE 1 provides an overview of each data set, including data format, source, and brief description.

### Disclaimer

The information provided in this report should be viewed as metadata that supports a detailed understanding of how the GIS data layers for this project were created, interpreted from historical documents, and are best used. In addition, we provide a summary of the historical watershed characteristics. This report has a limited focus on interpreting these data. We did not interpret or analyze landscape change or discuss implications for management. While we documented historical habitat and creek patterns in the watershed, we did not investigate historical ecological dynamics such as how the migration of the Los Angeles River impacted hydrological dynamics of the watershed. The "Next Steps" section of this report (see page 34) provides a comprehensive overview of potential efforts that would provide a better understanding and documentation of historical processes and conditions of the Ballona Creek and adjacent watersheds.

| GEOSPATIAL DATA PRODUCTS | | | | | |
|---|---|---|---|---|---|
| DATA LAYER | AVAILABLE FORMAT | REPRESENTATIONAL GEOMETRY | DATA SOURCES | CLASSIFICATION | DESCRIPTION |
| WETLAND LAYER | GEODATABASE, KML SHAPEFILE | POLYGON | COMPILED FROM SYNTHESIS OF ALL HISTORICAL DATA | HISTORICAL WETLAND CLASSIFICATIONS, SOURCE, CERTAINTY LEVELS | SEE METHODS SECTION OF THIS DOCUMENT FOR INFORMATION ON THE DERRIVATION OF THIS LAYER |
| CREEKS AND STREAMS | GEODATABASE, KML SHAPEFILE | LINE | USGS TOPOGRAPHIC MAPS, 1927 AERIAL PHOTOGRAPHY, IRRIGATION MAPS | SEASONALITY, SOURCE, CERTAINTY LEVELS | DATA LAYER REPRESENTS THE DISTRIBUTION OF HISTORICAL STREAMS IN THE STUDY AREA |
| GLO DATA | GEODATABASE, KML SHAPEFILE | POINT | GENERAL LAND OFFICE SURVEY DATA | ECOLOGICAL FLAGS | FIELD NOTES TRANSCRIBED INTO A GIS |
| SPECIFIC LOCATION DATA | GEODATABASE, KML SHAPEFILE | POINT | TEXTUAL DATA | NONE | TEXTUAL CITATIONS WITH ENOUGH INFORMATION FOR GEOREFERENCING TO A POINT LOCATION |
| NON-GEOSPATIAL DATA PRODUCTS | | | | | |
| SOURCE INSTITUTIONS VISITED | EXCEL | NA | NA | NA | LIST OF SOURCE INSTITUTIONS VISITED WITH BRIEF DESCRIPTION OF RELATED COLLECTION |
| CITATION LIST | EXCEL | NA | SOURCE INSTITUTIONS | ECOLOGICAL FLAG | EACH TEXTUAL CITATION WAS FLAGGED BASED ON REGIONAL LOCATION WITHIN THE WATERSHED, TYPE OF WETLAND, AND BASIC TYPE OF INFORMATION |
| HISTORICAL BIRD/PLANT SPECIMENS | EXCEL | NA | SOURCE INSTITUTIONS | NA | NA |
| BIBLIOGRAPHY | EXCEL | NA | SOURCE INSTITUTIONS | NA | LIST OF CITATIONS USED FOR THIS PROJECT |

***TABLE 1:*** *Data products created for the Ballona Historical Ecology project can be downloaded from* ***www.ballonahe.org****.*

## WATERSHED BACKGROUND

Historical accounts of the Ballona watershed suggest a landscape with vast and diverse sources of water. Descriptions of groundwater fed wetlands, springs, creeks, and lagoons were abundant in the early literature (Mesmer 1904, Regan 1917). These descriptions also suggest that before most of the county's hydrology was constrained to concrete channels, the prairie-like lowlands were often flooded from seasonal rainfall contributing to a dynamic and diverse watershed (LAT 1906, Regan 1917, USEO 1939, Schiffman 2005).

Understanding the unique history of this watershed is important as it helps to identify the most appropriate target time period for this project. Prior to 1825, the Los Angeles River flowed through the Ballona watershed and into the Ballona Lagoon. However, beginning in 1825, the Los Angeles region experienced three consecutive years of heavy rains that inundated the lowland (LAT 1906, Reagan 1917). Along with years of unusually high precipitation, the residents during this period frequently mention a series of earthquakes that rocked the Los Angeles area (Regan 1917). While it may not be possible to fully determine the extent of each natural change, it was after *both* of these that the discharge of the Los Angeles River shifted south to San Pedro.

Despite the newly formed southward course of the Los Angeles River, the inland marshes of the Ballona watershed although hydrologically altered, did not dry up. In both the lowlands and the Santa Monica Mountains, fresh water springs flowed in a southwest direction and sustained much of the inland marshland of the Ballona Creek. Because our goal was to identify the historical landscape that is most representative of the contemporary hydrodynamics and it is doubtful the Los Angeles River will ever flow into the Ballona estuary again, we chose the post-Los Angeles River migration period (1850-1890) as our target time period. This was also just prior to significant changes in land use that likely had a dramatic impact on water resources in the region, such as a shift from ranching to agriculture which was quickly followed by urban development (Stein et al. 2007).

The Ballona watershed geology played a major role in shaping its ecological patterns. Major factors controlling this geologic template include the Newport-Inglewood fault, which created the Baldwin Hills and other outcrops, aeolian beach-derived sand deposits, and the Holocene history of various courses of the Los Angeles River. The eastern part of the watershed comprises well-drained soils of the Los Angeles River's broad alluvial fan (FIGURE 1). Where the coarse alluvial fan deposits diminish, giving way to finer grain soils, wetlands occurred. Wetlands formed in the trough aligned with the Baldwin Hills and faulting throughout the watershed. These geologic patterns expressed themselves in habitats found in the 19th century, such as the groundwater fed wetland complex at the base of the Baldwin Hills and the springs in the Santa Monica Mountain foothill regions.

## METHODS

The following section provides a broad overview of the analytical process used to map wetlands in the study area and provides guidance the most effective use of the data relative to current restoration and management practices. Land use history was investigated as it related to wetland location, type, and extent. A detailed investigation of the history of land and water use for the Ballona watershed is, however, beyond the scope of this study.

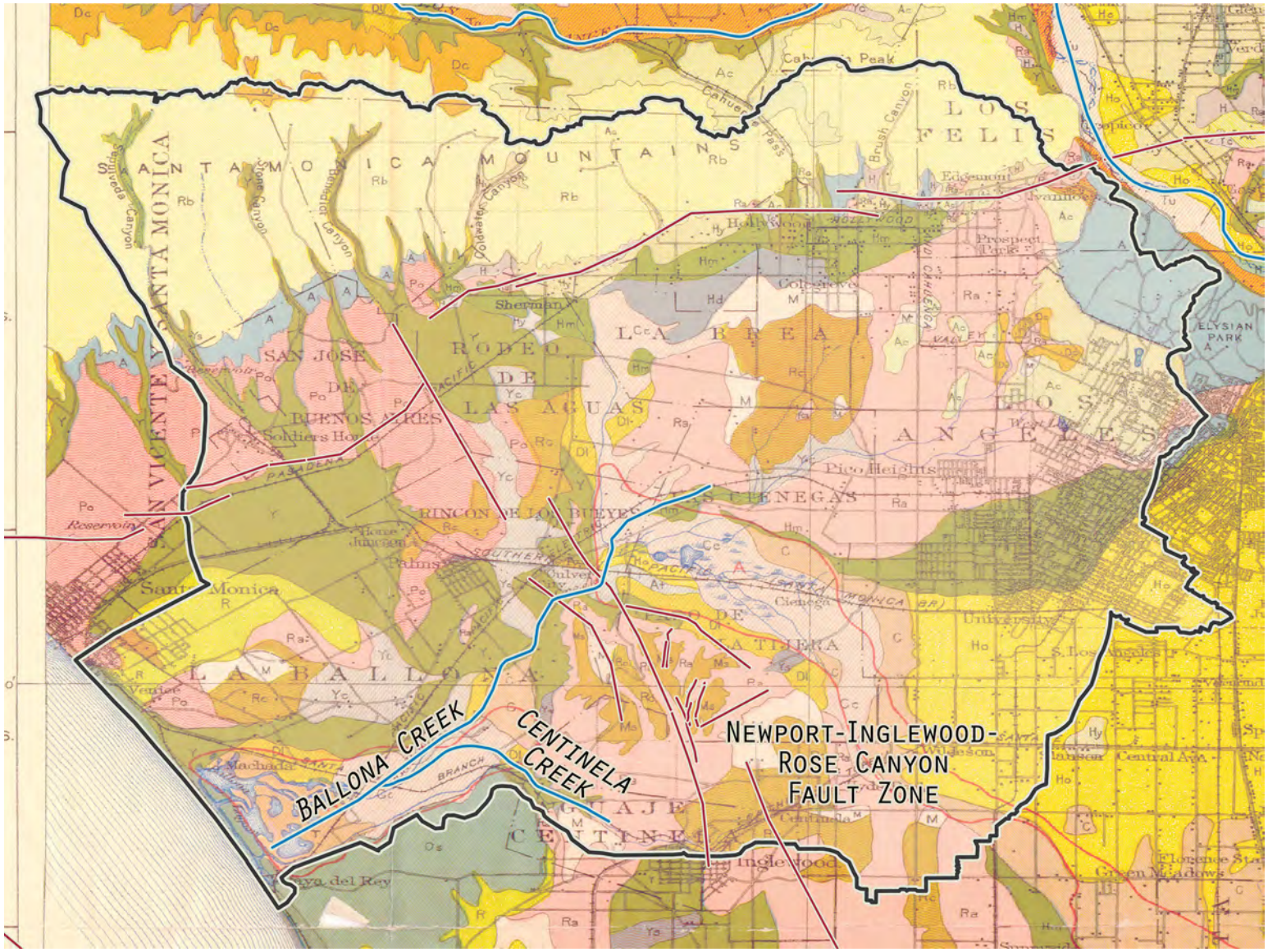


***FIGURE 1:***
*Historical soil map (Nelson et al. 1917) demonstrating the extent of the historical Los Angeles River alluvial fan (dark yellow) within the Ballona watershed.*

Our methodology can be divided into a series of phases; data collection/data compilation, synthesis/interpretation, and mapping. Each phase of the project represents a systematic and consistent process that has been developed by the San Francisco Estuary Institute (SFEI) and applied across many historical ecology projects throughout the state of California (e.g., Grossinger et al. 2006, Grossinger et. al. 2007, Stein et al. 2007, Grossinger et al. 2008, Beller et al. 2010, Beller et al. 2011). FIGURE 2 demonstrates the various phases of the project and the primary tasks completed in each phase.

### Data Collection and Compilation

Mapping historical wetland features is dependent upon building a body of evidence to support habitat boundaries, classification interpretations, and

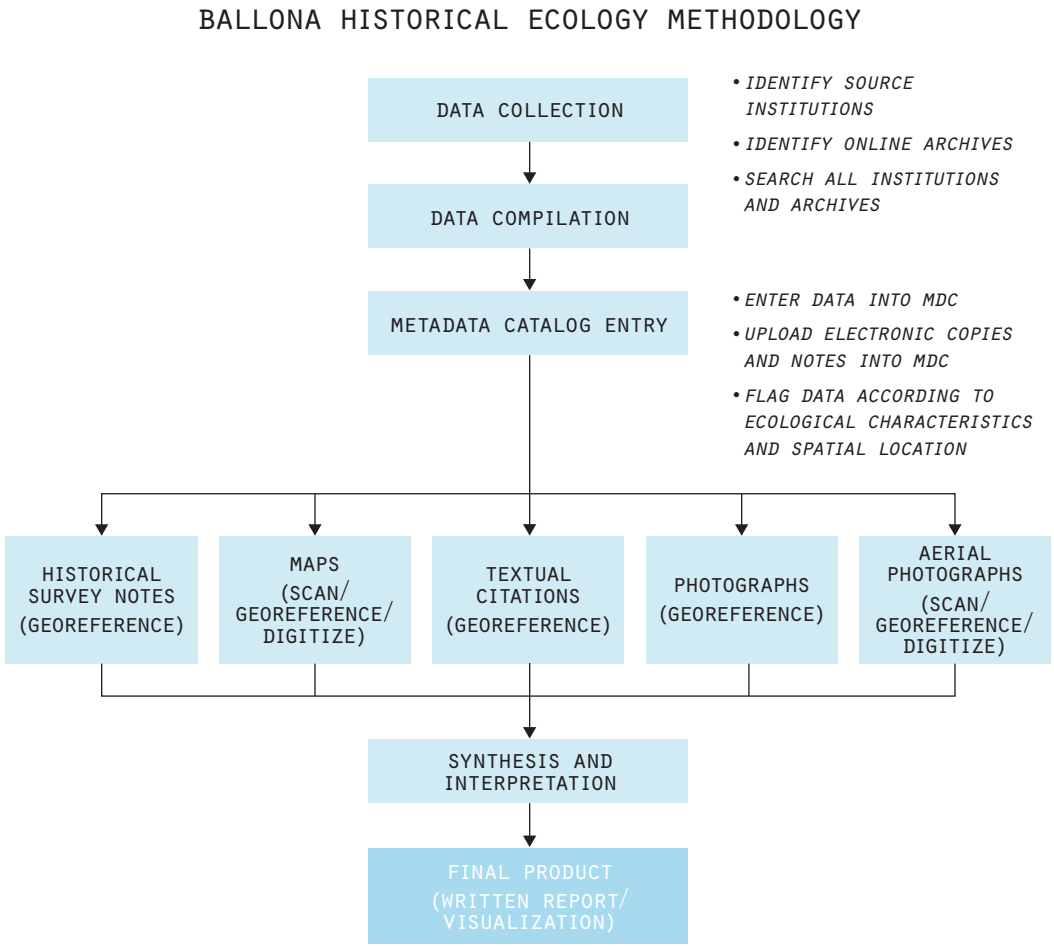


***FIGURE 2:*** *Schematic illustration of research process for historical data acquisition and use in historical ecology. Methodology described in detail in the following sections.*

certainty of the features mapped. For this project, we visited 84 source institutions (50 physical archives and 34 online archives) throughout the state of California, although the majority of institutions are located in Southern California. These institutions included libraries, government agencies, historical societies, map archives, and other institutions housing related historical documents. One of the most notable collections investigated for this project was the Solano Reeves map collection found at the Huntington Library, which provided both early surveyor maps of Los Angeles County and field notes not attainable through other sources.

Over 300 documents were collected. The documents included written accounts, historical photographs (landscape and aerial), and historical maps. Our data collection efforts focused on 19th century sources; a few data sets from the 20th century (e.g. 1927 aerial photography, 1917 soil map) were also collected. The variety of data sets from overlapping time periods allowed for a comprehensive assessment of persistent wetland features and an in-depth interpretation of their classification. We relied on each overlapping dataset to understand the complexity of the ecological pattern and function of the landscape, and our confidence in conclusions about these features was commensurate with the supporting weight of evidence.

Written documents provided detailed insight, supplementing historical map interpretation and allowing for a more comprehensive depiction of the landscape. In some instances, textual data provided significant support for wetland features depicted on a historical map. For example, the following quote identifies the size of a depression and its associated flow regime:

> *"In the Northwest corner of the parcel secondly described in said order of partition, I found a depression cover about sixteen acres, which was filled up by the rains in winter so as to render it unfit for either cultivation or pasture."*
> ***–Solano (1893)***

This information allowed us to verify the size of the mapped feature and classify it as a vernal pool given the additional information about seasonality. Other quotes provided a general overview of the study area:

> *"In the medium part of this southwest course [Ballona Creek] it is bordered on either side by a rich plain of several thousand acres in area, and which, to some extent, it has served in irrigation for a long number of years. The lands irrigated are all within the rancho La Ballona and the waters have for many years been considered as appurtenant thereto."*
> ***–Hall (1888)***

> *"In several depressions or arroyos of the Santa Monica plain, and at the footing of that plain against the Centinela hills, as elsewhere better explained, there are a number of little water sources of the class called cienegas, and which have been referred to in this report, also as cienega springs, and sometimes as artesian springs. A belt of these sources in the ranchos La Brea, Rodeo de los Aguas, and Santa Monica, is found one to three miles out from the mountain's base, and nearly half way down the plain."*
> ***–Hall (1888)***

> *"Coldwater Canyon Creek; Ballona Creek basin; Los Angeles County; an intermittent stream, 3 or 4 miles long, draining a small area in the Santa Monica Mountains, and flowing southward and southeastward into Rodeo de las Aguas Rancho. Near the mouth of its canyon it receives streams draining from Franklin and Higgins canyons."*
> ***–Lee (1912)***

Historical photographs collected from the Los Angeles Public Library and the Huntington Library also provided insight into landscape conditions throughout the watershed. Some of the most useful photographs were those that did not have a principal focus on ecology, but depicted enough of the landscape to provide corroborating data. For example, the photograph in FIGURE 3 depicts recreational boating on Ballona Lake, which gave us insight into not only the size and extent of the dunes surrounding this feature, but also the cultural value of the physical landscape at this site.

A variety of unique historical thematic and reference maps were collected, many of which became the primary source of mapping. Some examples of these include the Hall irrigation maps (1888), a variety of soil maps (1903–1916), and diseño maps of California land grants (circa 1840). The Hall irrigation maps are two maps produced in conjunction with an irrigation report, Irrigation in California by the California State Engineer, William H. Hall in 1888. These two maps focused on water works, developments, and use within Southern California (Hall 1888). The maps provided an accurate depiction of natural hydrological features such as channels and springs (FIGURE 4).

Additionally, ecological features were accurately presented in the Hall irrigation map, allowing us to use the map as a primary source to digitize historical wetlands (FIGURE 5). Primary digitizing sources were those that we used as a primary source to create habitat boundaries (though thse boundaries may bave been further adjusted based on additional subsidiary evidence). Because of the maps' accuracy, composition, and time frame they served as a useful source, particularly in areas with large and diverse wetland complexes.

Similarly, the 1876 T-Sheet (Chase 1876; T-1432B) was another dataset that was key to the completion of this project. T-Sheets were produced between 1851 and 1900 by the United States Coast Survey. These accompanied surveys completed along the Southern California coastline (Grossinger et al, 2011). Specifically, the T-Sheet we utilized for this project included the Ballona Lagoon and immediate wetlands as surveyed in 1876. Produced at an unusually large scale (1:10,000),

***FIGURE 3:***
*Ballona Lake located at what is now Del Rey/Ballona Lagoon (photo courtesy of the Los Angeles Public Library).*

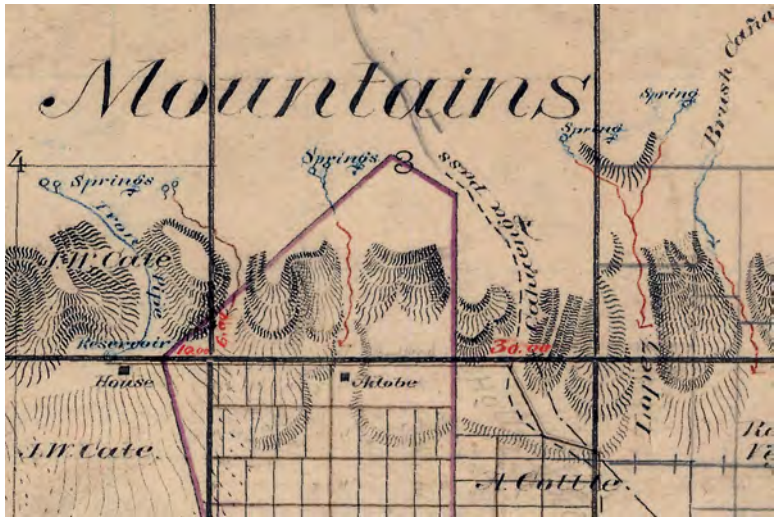


***FIGURE 4:***
*Detail of Hall (1888) irrigation map demonstrating the location of springs in the Santa Monica Mountains.*

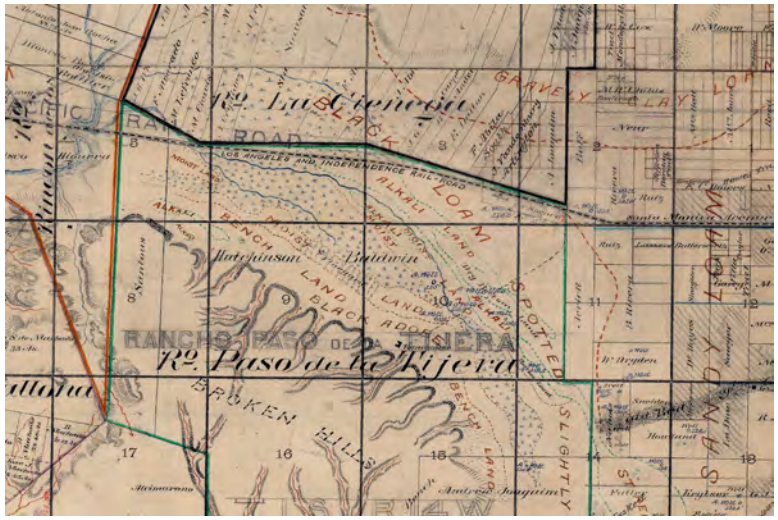


***FIGURE 5:***
*Detail of Hall (1888) irrigation map demonstrating the level of detail in describing habitat types in the La Cienega area at the base of present day Baldwin Hills.*

this map provided a level of detail not available on other data sets. It was useful for mapping fine scale features within the estuary, especially when used in conjunction with other data sources (FIGURE 6).

We also obtained detailed ecological information from the General Land Office (GLO) Public Land Survey (PLS) survey notes. Initiated in 1785, the GLO Public Land Survey was carried out by dividing the land into a grid system. Land was divided into 36 mi2 townships and further divided into square mile sections. In California, Mexican land grant boundaries were not modified, though surrounding lands were assimilated into the township-range system. Surveyors ran the boundaries of these land divisions, including those of the Mexican land grants, taking note of distances and notes on the landscape including any significant human made and natural features to establish these boundaries. The GLO survey notes provide an array of detailed historical ecological descriptions that could be spatially referenced. Notes often included information about hydrology, soil types, and vegetation. At times, survey notes were extremely detailed, providing channel morphology descriptions, physical characteristics of trees, including species, height, and diameter, and wetland descriptions (Manies 1997). In the Ballona watershed, GLO surveys were conducted from 1850 to 1895, with the most frequent survey period being around 1870.

### *Metadata Catalog*

Once collected, photographs, maps, and textual data were uploaded into an online metadata catalog. Given the collaborative nature of this project, being able to share data dynamically was important to reduce repetition of effort, to allow for collaborative viewing of data, and to

facilitate regional synthesis and ongoing investigations. The catalog provided the means to organize and query historical documentation by spatial location, wetland descriptions, time period, and source (FIGURE 7). Upon review and entry to the catalog, each source was assigned metadata such as year, author, and keywords pertaining to the item's ecological content. The assigning of metadata within the online catalog system allowed us to query our data sources by using simple to complex parameters in an efficient manner with relative ease. For example, we were able search citations by year or by year, location, author, and citation type (i.e., map, text, or photograph). The metadata catalog also allowed for data to be uploaded to a centralized location via ftp so that team members were able to download and access the data dynamically. Bibliographic tables


***FIGURE 6:***
*Chase (1876) T-Sheet demonstrating the detail used to map the Ballona Lagoon.*

Subset Records by Title:
Subset Records by Reference Type: All
Subset by Primary Source:
Subset by Collector:

| | Reference Type | Author | Journal / Publisher | Found (Y/N) | Acquired (Y/N) | Useful (Y/N) | Original Scan Aquired (Y/N) | Title | Year | Primary Source | Call # | Secondary Source | Call # | Tertiary Source | Call # | Geographic Area | Watershed | Scale | Description | Keywords | Collector | File Path | GeoReferenced (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Select | Text | Mesmer, L. | | Yes | Yes | Yes | | Soil Survey of the Los An ... | 1904 | Google Book Search | | | | | | Los Angeles County | | | Soil survey for Los Angel ... | soils, hydric soils | S. Dark | Mesmer_1904_soilsurvey.pdf | |
| Select | Map | Unknown | | Yes | Yes | Yes | Yes | Map Showing Part of the R ... | 1887 | LA County Department of Public Works | MR022-020 | | | | | Rancho Rincon de los Buey ... | | | Plat map scanned by LA Co ... | sycamore, valley floor habitats | S. Dark | MR022-020.pdf | Yes |
| Select | Map | Mesmer, L. | | Yes | Yes | Yes | Yes | Soil Map: Los Angeles She ... | 1903 | University of Alabama, Department of Geography | | | | | | Los Angeles County | | 1:62,500 | Great soils map, really g ... | soils, hydric soils, cienegas | S.Dark | UnivAlabama_map_Mesmer_1903.sid | Yes |
| Select | Text | Salvator, L. | | Yes | No | Yes | | Los Angeles in the Sunny ... | 1929 | First-person Narratives of California's Early Years | F869.L8 L94 | | | | | General Study Area | | | Very general description ... | Springs, rivers | S. Dark | AmerMem_text_Salvator.doc | |
| Select | Map | Jonas, C. | | Yes | Yes | Yes | Yes | Index map to county surve ... | 1950 | Library of Congress Map Collections | G1528.L6 R3 1950 | | | | | LA Basin | | 1:24000 | General index map for sur ... | Surveyor index | S.Dark | LiboCong_Map_1950.zip | Yes |
| Select | Text | Grinnell, J. | | Yes | Yes | Yes | | Birds of the Pacific Slop ... | 1898 | Archive.org | None | | | | | Los Angeles County | | | Birds of LA County. Usefu ... | Birds | S. Dark | GrinnellJ_Archive_1877_birds.pdf | |
| Select | Map | Solano, A. | | Yes | Yes | Yes | Yes | Map of Those Parts of the ... | 1868 | LA County Department of Public Works | 3204 | | | | | Rancho La Ballona | | | Plat map scanned by LA Co ... | lagoon | S. Dark | MR003_204_laballona.pdf | Yes |

***FIGURE 7:***
*Sample of the online metadata catalog used to store, query, and flag data.*

and information about source institutions may also be downloaded from this online database creating a secondary product for stakeholder use. These data products are available at **www.ballonahe.org**. This type of metadata catalog creates a living tool for the discovery of new information and allows for the creation of different questions that can be explored by future researchers.

***Data Processing***

Certain sources required further processing in the form of spatial reference assignments. Maps were georeferenced, GLO data was transferred to a point layer via linear referencing, and aerial photographs were orthorectified and mosaiced into a single data layer. This allowed us to assimilate a significant portion of our data sources into Geographic Information System (GIS) software for electronic mapping. Some data sources were not spatially referenced. These sources, including photographs and most textual documents, were still organized geographically via their metadata, printed, and compiled manually for use during the interpretation process. Over 150 maps were georeferenced. Textual citations with enough spatial detail were also georeferenced into a point layer. For this point layer, the associated textual description and citation were recorded in the features attribute table. Over 50 of these "specific location" points were digitized.

### Mapping and Interpretation of Historical Documents

All mapping was completed using a Geographic Information System (GIS). ArcGIS 9.3 (ESRI) software was used to display, manipulate, and compare spatial data sources as well as create our final geospatial dataset. As discussed in the previous sections, data sources that could not be spatially referenced were printed and organized by very general regional spatial locations (as flagged in our metadata catalog). These data sources were reviewed as we mapped each of these regions and often provided valuable nuanced descriptions of wetlands in the study area that maps could not provide, such as details about tree species or plant composition not depicted on a map. Using GIS, data sources were organized and spatially overlayed with each other, which not only allowed us to view features across multiple datasets, but also allowed us to view change over time. Subsequently, this granted us the ability to better establish the shape, location, and identification of persistent wetland features while at the same time considering the variability (or lack thereof) in the physical and relational aspects of those features through different datasets.

The ability to compare the numerous historical data sources allowed us to build a body of evidence and assess the certainty of each persistent landscape feature mapped. Drawing upon methodological approaches used in previous studies in California, we documented each feature using multiple sources from varying years and authors to ensure accurate interpretation (Grossinger 2005, Grossinger et al. 2007). This was possible for many features, although others (notably some ponds and springs) were only documented by one source.

Usually, the most detailed and accurate datasets that fell within our target mapping period were used to map features. These sources included the Hall irrigation maps and historic topographic maps. After initial digitizing, other datasets were reviewed to determine if corroboration between them deemed it necessary to modify a given feature's properties, such as shape, location, attributes, and sometimes, identification.

Datasets that were produced within our target mapping period, 1850 to 1890, were given mapping priority. Datasets that fell outside of this range were used only as interpretation sources for already mapped features. Interpretation sources are those sources that gave us additional evidence in our interpretation but were not used as a mapping source. These datasets were not used as a mapping source because it is likely they depicted the landscape after significant modification by European settlement and could only be used as supporting evidence for persistent features found on earlier maps. Examples of these include the soil survey maps and aerial photographs. Whenever photographs or textual documents supported the interpretation of features their citation was added to the feature's attributes, specifically as an interpretation source. Seldom did photographs provide extreme corroboration, but there were times where photographs were vital. For example, a set of oblique aerial photographs taken over the Ballona Lagoon provided excellent corroborating evidence to the shape of included waterbodies (FIGURE 8).

Another important component of the mapping methodology involved transcribing and spatially referencing the GLO survey notes. A total of 1,913 survey points were produced with just over 900 points solely dedicated to describing natural features mapped by the GLO during their surveys. These data proved invaluable due to both their spatial and descriptive accuracy. GLO points were often used to confirm boundaries of habitat features. In several GLO survey notes surveyors would note when they entered or left an area of a given habitat type. Thus, it was common to find phrases such as "enter swamp" or "leave prairie" within GLO surveys. These points aided in modifing feature boundaries that were initially drawn from primary mapping sources. Ultimately, the GLO data resulted in a more refined physical shape in the wetland areas mapped and supported more detailed intepretation. These surveys were

***FIGURE 8:***
*Oblique aerial photograph of the Ballona Lagoon taken from the current site of Loyola Marymount University (circa 1940, photo courtesy of Loyola Marymount University, Special Collections). Areas with a smooth, lighter signature in the background are either open water or unvegetated areas.*

also aligned with known rain and drought cycles to better inform our interpretations.

Streams were mapped primarily from the historical aerial photographs and historical topographic maps (because of their improved spatial accuracy compared to older mapping sources). When available, other data sources were used to provide additional interpretation validation such as the Hall Irrigation Map (1888). All streams that were consistently present across the historical aerials, topographic maps, and irrigation map (Hall 1888) were digitized. However, we prioritized digitizing from the aerials because the spatial referencing was the most accurate. The topographic maps and irrigation maps were in this order of priority where the feature was no longer present on the aerials. The channel network in the watershed was not analyzed extensively due to two factors. First, preedominantly intermittent streams dominated the Ballona watershed; this likely is the result of porous soils, geology, and climatic conditions (Hall 1888). We were only able to identify two major channels that were perennial: Ballona Creek and Centinela Creek. Second, as would be expected, corroborating evidence for the remainder of the intermittent channel network was sparse.

### Estimating Confidence in Mapped Polygons

Measuring and quantifying certainty is critical to the final interpretation and usefulness of historical ecology data. Following Grossinger (2005), feature attributes were developed to capture the estimated certainty of a mapped feature's interpretation, size, and location. Each feature was assigned these attributes to provide a concise assessment of how confident we are in its presence and habitat classification, and in its spatial accuracy (Grossinger and Askevold, 2005). Certainty levels were based primarily on the number, type (i.e. GLO versus historical topo) and quality (i.e. degree of detail and/or spatial accuracy) of the data sources (TABLE 2). For example, a feature such as a wet meadow may be supported by numerous and highly detailed independent data sources would be assigned a "high" value for interpretation certainty. On the other hand, a wet meadow referenced in only 1 or 2 more contemporary historical documents may

| CERTAINTY LEVEL | INTERPRETATION | SIZE | LOCATION |
|---|---|---|---|
| HIGH "DEFINITE" | FEATURE DEFINITELY PRESENT BEFORE EURO-AMERICAN MODIFICATION | MAPPED FEATURE EXPECTED TO BE 90%–110% OF ACTUAL FEATURE SIZE | EXPECTED MAXIMUM HORIZONTAL DISPLACEMENT <50 METERS |
| MEDIUM "PROBABLE" | FEATURE PROBABLY PRESENT BEFORE EURO-AMERICAN MODIFICATION | MAPPED FEATURE EXPECTED TO BE 50%–200% OF ACTUAL FEATURE SIZE | EXPECTED MAXIMUM HORIZONTAL DISPLACEMENT <150 METERS |
| LOW "POSSIBLE" | FEATURE POSSIBLY PRESENT BEFORE EURO-AMERICAN MODIFICATION | MAPPED FEATURE EXPECTED TO BE 25%–400% OF ACTUAL FEATURE SIZE | EXPECTED MAXIMUM HORIZONTAL DISPLACEMENT <500 METERS |

***TABLE 2:***
*Certainty levels assigned to historical features on the Ballona Historical Ecology Project (after Grossinger et al. 2007).*

receive a lower value. Confidence values were assigned not just on the number of data sources supporting the presence of a particular feature, but also on the quality and time period of the individual data source. For example, the Hall Irrigation map (1888) provided detailed information about wetlands mapped, as such, wetlands mapped from this source were given a consistently higher confidence value for interpretation than a feature found on a few coarse scale maps (such of topographic maps) that had very little detail. Estimation of certainty is critical to the scientific credibility of any study and reinforces why conclusions about historical conditions must be based on corroboration of multiple lines of independent evidence. Ultimately, land managers and other stakeholders can utilize these objective classifications of certainty to guide the decision making process by helping to determine how extensively results are applied to various land management and restoration activities.

### Assessment of Historical Plant and Bird Communities

We also collected about the natural history of the study area, concentrating on plants and birds. For plants, all of the digitized herbarium records available from the state clearinghouse (Jepson Interchange) for Los Angeles County were obtained. Because these records contain many spelling errors and the locations are not reported in a standardized manner, they were sorted through (100,382 records) manually to extract those records from the Ballona watershed and to exclude exotic species, leaving 2,342 records of native species. These were updated with current nomenclature, sorted into families, and coded with the standard U.S. Fish and Wildlife Service codes for wetland indicator status. Each record was then assigned to a region within the watershed to develop species lists for each. For birds, we obtained nest and egg set records from the Western Foundation for Vertebrate Zoology for a suite of riparian indicator species: Black Phoebe, Common Yellowthroat, Black-headed Grosbeak, Least (Bell's) Vireo, Yellow Warbler, House Wren, Long-tailed Chat, Little Flycatcher, Western Wood-Pewee, Song Sparrow, Barn Swallow, and Cliff Swallow. Searches were not made for species associated with coastal wetland features. Region and nest condition notes were consolidated from these records as indicators of riparian vegetation.

## RESULTS

A diversity of wetlands were mapped in the Ballona watershed during the target time period with four major types of wetlands dominating the watershed; coastal wetlands, the inland La Cienega complex (consisting of groundwater and surface water associated depressional wetlands), seeps and springs, and creeks (FIGURE 9). Particularly unique to this watershed was the continued legacy of the migration of the Los Angeles River and its effect on the nature and distribution of wetlands. During the target period of analysis, Ballona Lagoon was undergoing a transition from a wetland at the terminus of the large Los Angeles River watershed to a system associated with the smaller Ballona Creek watershed. The shift to a smaller watershed likely resulted in a reduction in the magnitude and frequency of high energy scouring flows experienced by the estuary. Historical analysis of the Ballona watershed is also complicated by the relatively early human impact beginning in the mid-19th century which escalated in pace into the early 1900s along this portion of the southern California coast.

A total of 174 unique wetland polygons were mapped comprising 14,149 acres (5,470 ha; TABLE 3). The dominant wetland types across the entire study area included alkali meadow (35%), valley freshwater marsh (10%), brackish to salt marsh/tidal marsh (9%), and alkali flats (8%). The watershed contained a wide diversity of wetlands ranging from vernal pools and alkali flats to wetland meadows and willow thickets (excluding willow-dominant riparian corridors). It is likely that our habitat map did not capture the total complexity of this landscape, due to a lack of documentation in the historical record, or inability to display using a habitat map. For example, textual citations describing features at a finer scale cannot be incorporated into a two-dimensional map, but lend depth to our understanding of habitat diversity. We hope to provide a cautioned insight into the complexity of this ecological system in the following pages.

| HABITAT CLASSIFICATION | UNIQUE WETLANDS | ACRES | HECTARES |
|---|---|---|---|
| ALKALI FLAT | 5 | 1284 | 486 |
| ALKALI MEADOW | 21 | 5273 | 1915 |
| BEACH | 2 | 159 | 64 |
| DUNE | 8 | 187 | 76 |
| OPEN WATER* | 8 | 96 | 39 |
| PERENNIAL FRESHWATER POND | 8 | 110 | 45 |
| SALT FLAT/TIDAL FLAT | 15 | 423 | 171 |
| SALT MARSH/TIDAL MARSH | 20 | 1240 | 498 |
| VALLEY FRESHWATER MARSH | 35 | 1356 | 547 |
| VERNAL POOL | 15 | 260 | 105 |
| WET MEADOW | 24 | 3336 | 1351 |
| WILLOW THICKET | 13 | 425 | 173 |
| TOTALS | 174 | 14149 | 5470 |

*DOES NOT INCLUDE PACIFIC OCEAN

***TABLE 3:***
*Summary of wetlands mapped on the Ballona Historical Ecology project.*

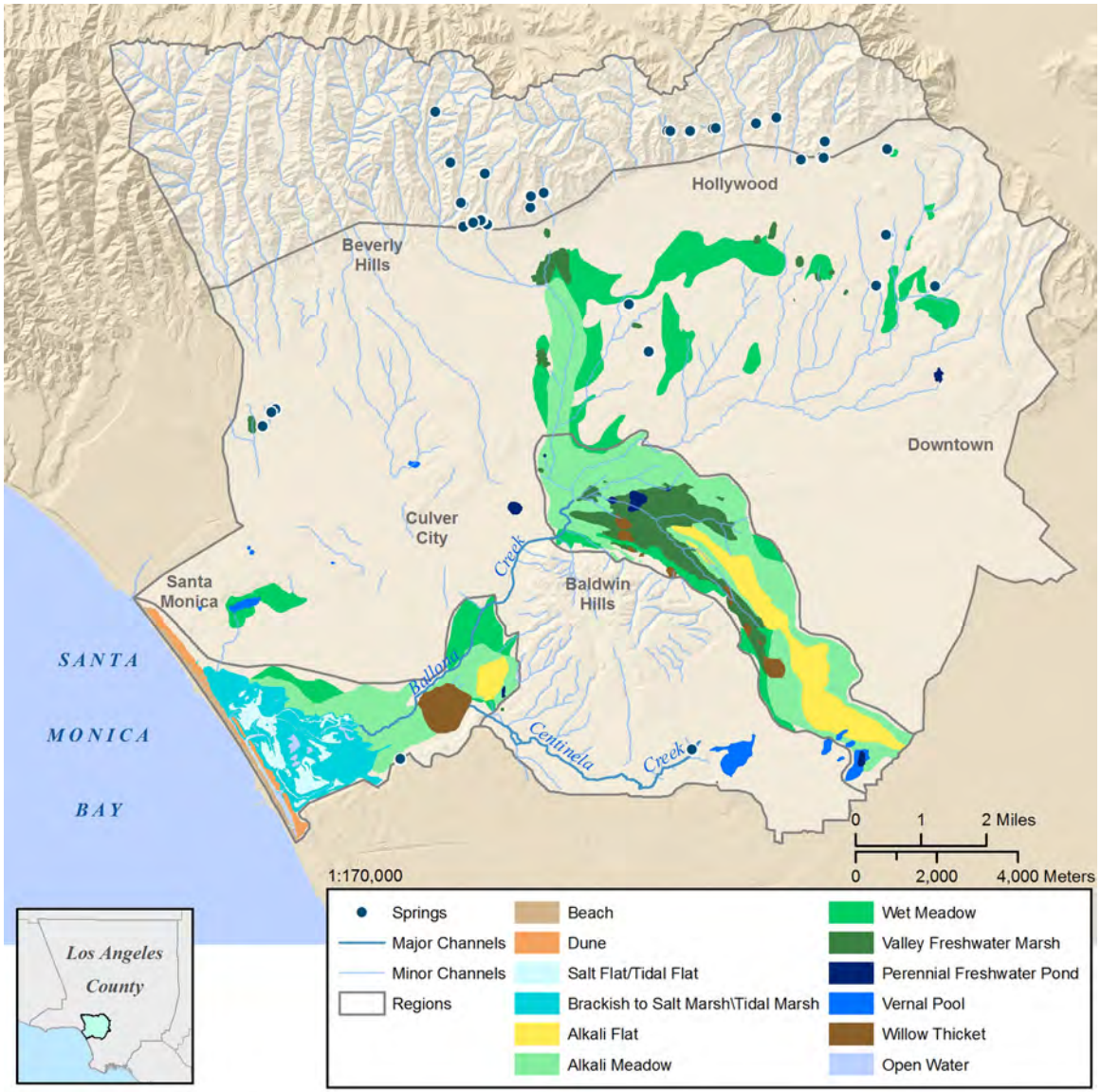


***FIGURE 9:*** *Wetlands mapped for the Ballona Historical Ecology project.*

The historical location and extent of wetlands in the Ballona watershed was extensive compared to their contemporary distribution. Although discrete boundaries of historical wetlands can be challenging to identify in many instances, a few substantial wetland complexes were clearly evident, namely the La Cienega wetlands and the Ballona Lagoon complex. These complexes, in addition to other topographic and ecological factors, were used to organize the Ballona watershed into meaningful units of analysis. The four regions are Ballona Valley, Ballona Lagoon, Santa Monica Mountain Foothills (SAMO), and La Cienega. Key hydrologic features, Ballona and Centinela Creeks were discussed separately (FIGURE 10).

Each of these regions demonstrated a unique profile of wetland types (FIGURE 11). Two significant wetland complexes (La Cienega and Ballona Lagoon) supported the largest extent of wetland habitat in the watershed. Freshwater marsh surrounded by numerous other habitat types (primarily alkali meadows and flats) dominated a broad band of habitat making up the La Cienega complex. Brackish to salt/tidal marsh was the principal component making up the Ballona Lagoon complex, although various other habitat types were present as well. Elsewhere across the valley floor wetland habitat existed but was sparse with the exception of intermittent streams, which were in greater abundance. Various freshwater ponds, vernal pools, wet meadows, and freshwater marshes and numerous springs were found throughout the watershed.

We mapped 232 miles (373 km) of historical stream channels in the study area (FIGURE 10). One characteristic of the channels is their lack of continuity across the watershed, especially in the Ballona Valley region. With the exception of Ballona Creek, virtually every

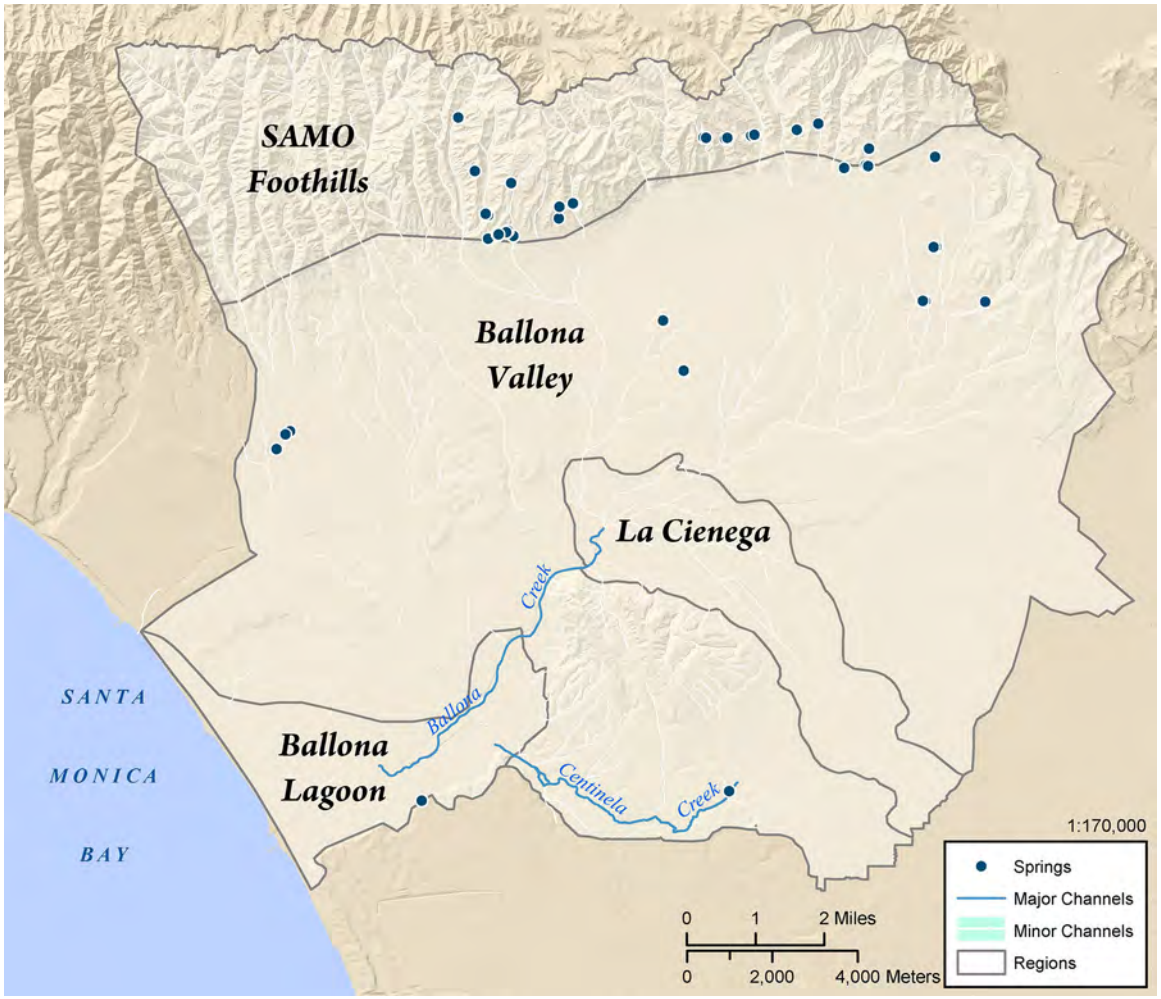


***FIGURE 10:*** *Regions and distribution of springs mapped within the Ballona watershed.*

other channel either sank into porous soils or spread into the major wetland complexes of La Cienega and the Ballona Lagoon. While this characteristic may have contributed to a significant amount of subsurface water flow and consequently to the vast wetland complex at La Cienega, we were unable to discern if this pattern was naturally occurring or the result of land use changes (that may have lowered the water table) during our target time period.

Although springs were present at a few locations throughout the Ballona Valley, 70% of the springs in the Ballona Watershed were found in the Santa Monica Mountain foothills (primarily from Hall 1888; see FIGURE 10). These springs were clustered in the foothills and stopped abruptly at Franklin Canyon. This distribution could be the result of fault displacement or geologic composition.

In the following sections, a landscape profile of wetlands found within each of the regions identified in the study area. The landscape profile includes a review of wetland types, extent, and spatial distribution. In addition, we have included a discussion of stream characteristics within each region.

### Ballona Valley

Ballona Valley was the largest region in the study area, comprising the entire valley floor (FIGURE 12). Streams from the surrounding foothill regions drained into the valley floor and in many places disappeared as they flowed across alluvial fans with porous soils. However, in some places spring fed wetlands gave way to wetland and alkali meadows, the dominant wetland types within this region.

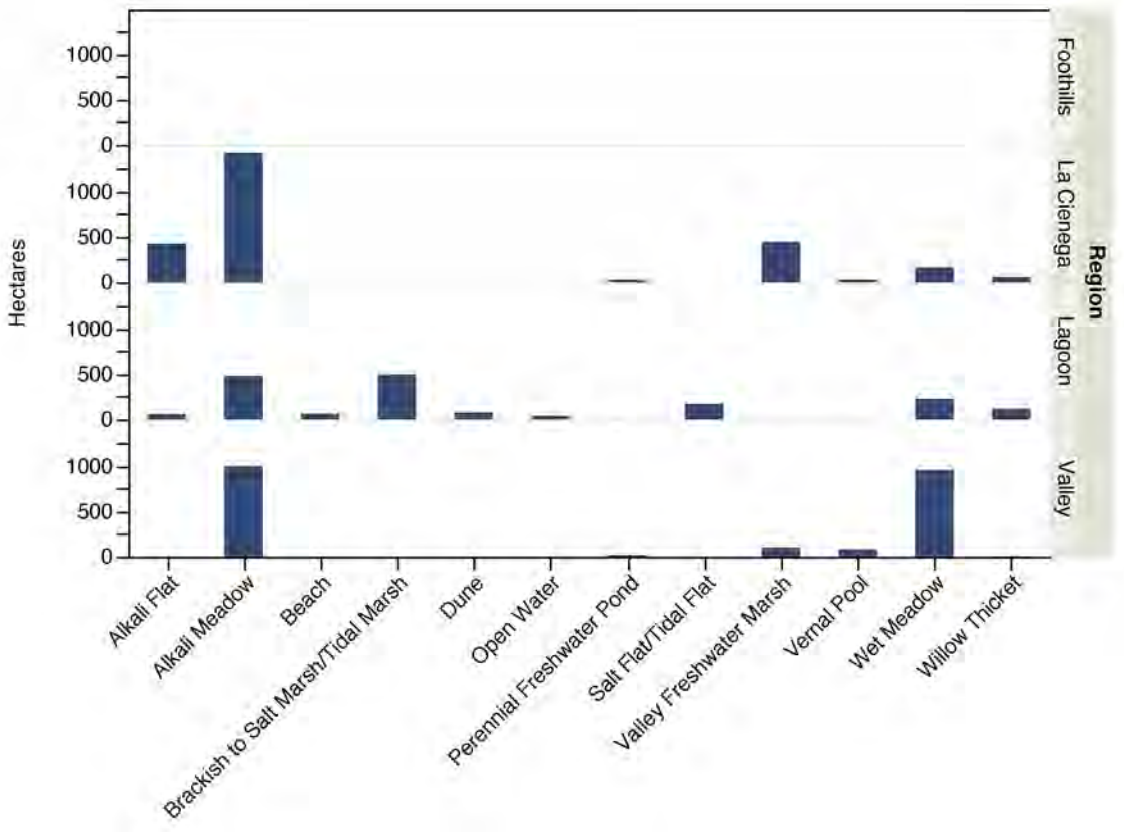


***FIGURE 11:*** *Landscape profile for each region in the Ballona watershed.*

### *Wetlands*

Wetland habitat, excluding streams and associated riparian areas, covered five percent (5,327 acres) of the Ballona Valley region. We mapped five different types of habitat on the valley floor: valley freshwater marsh (242 acres), wet meadow (2,370 acres), alkali meadow (2,479 acres), freshwater ponds (37 acres) and vernal pools (197 acres) (TABLE 4). With just two freshwater ponds and only one lake documented in the historical record, perennial water bodies were scarce throughout the region.

On the other hand, 12 vernal pools, and a significant vernal pool complex were present, probably comparable in flora to vernal pools described for the Los Angeles Coastal Prairie immediately to the south (Mattoni and Longcore 1997). Concentrations existed in both in the southwestern and southeastern portions of the region. One vernal pool located in the southwest portion of the Valley is noteworthy due to its size (16 acres) and an abundance of supporting historical documentation both in narrative and map form (Carson 1883, Solano 1893) (FIGURE 13). This wetland feature is also shown on a Solano Reeves (1893) map which indicates a channel connecting the depression to the Ballona Lagoon.

| HABITAT CLASSIFICATION | UNIQUE WETLANDS | ACRES | HECTARES |
|---|---|---|---|
| ALKALI MEADOW | 1 | 2479 | 1003 |
| PERENNIAL FRESHWATER POND | 2 | 37 | 15 |
| VALLEY FRESHWATER MARSH | 14 | 242 | 98 |
| VERNAL POOL | 12 | 197 | 79 |
| WET MEADOW | 14 | 2370 | 959 |
| WILLOW THICKET | 1 | 2 | 1 |
| TOTALS | 44 | 5327 | 2155 |

***TABLE 4:***
*Habitat types mapped in the Ballona Valley region of the Ballona Watershed.*

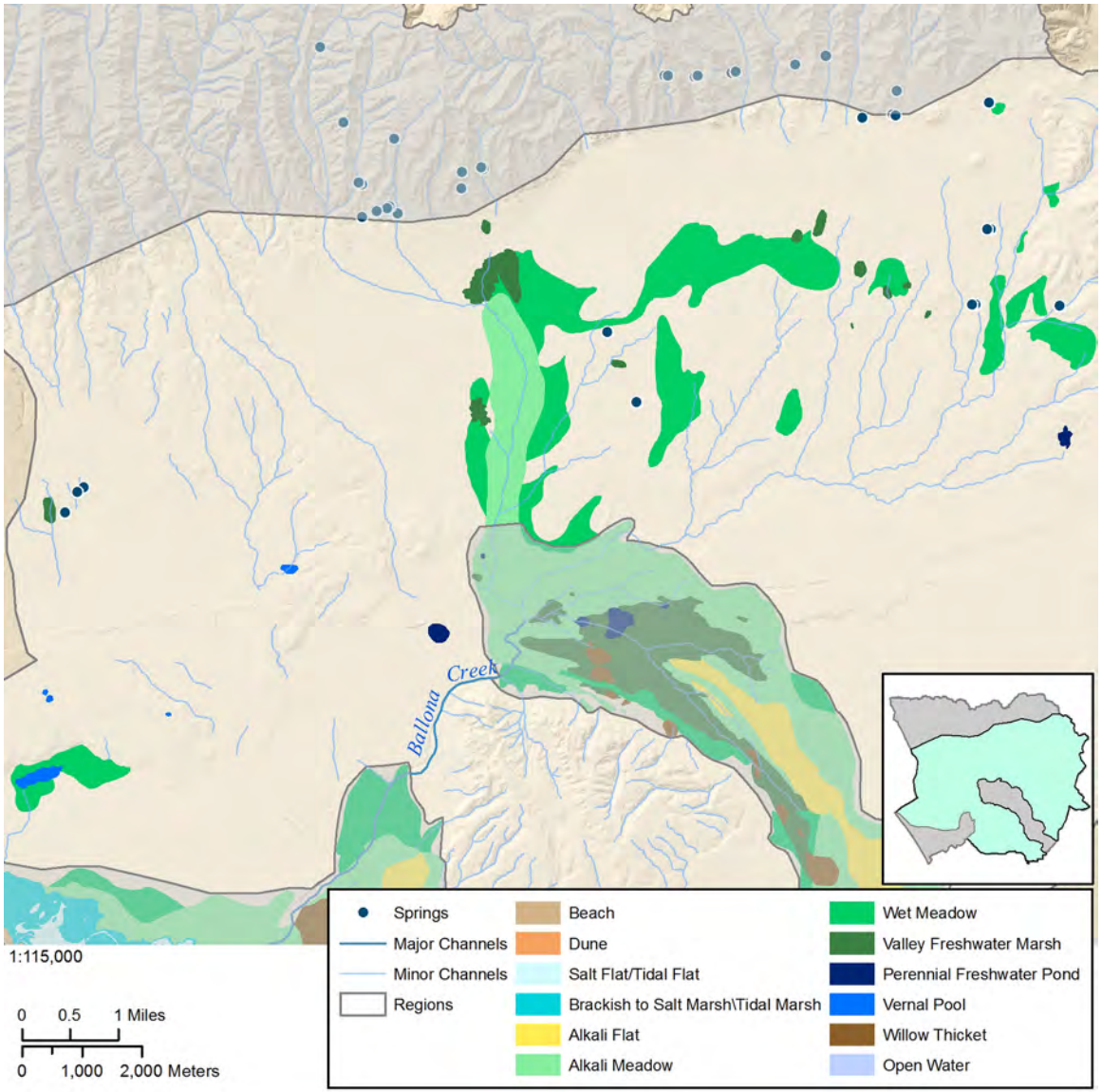


***FIGURE 12:*** *Wetlands of the Ballona Valley region.*

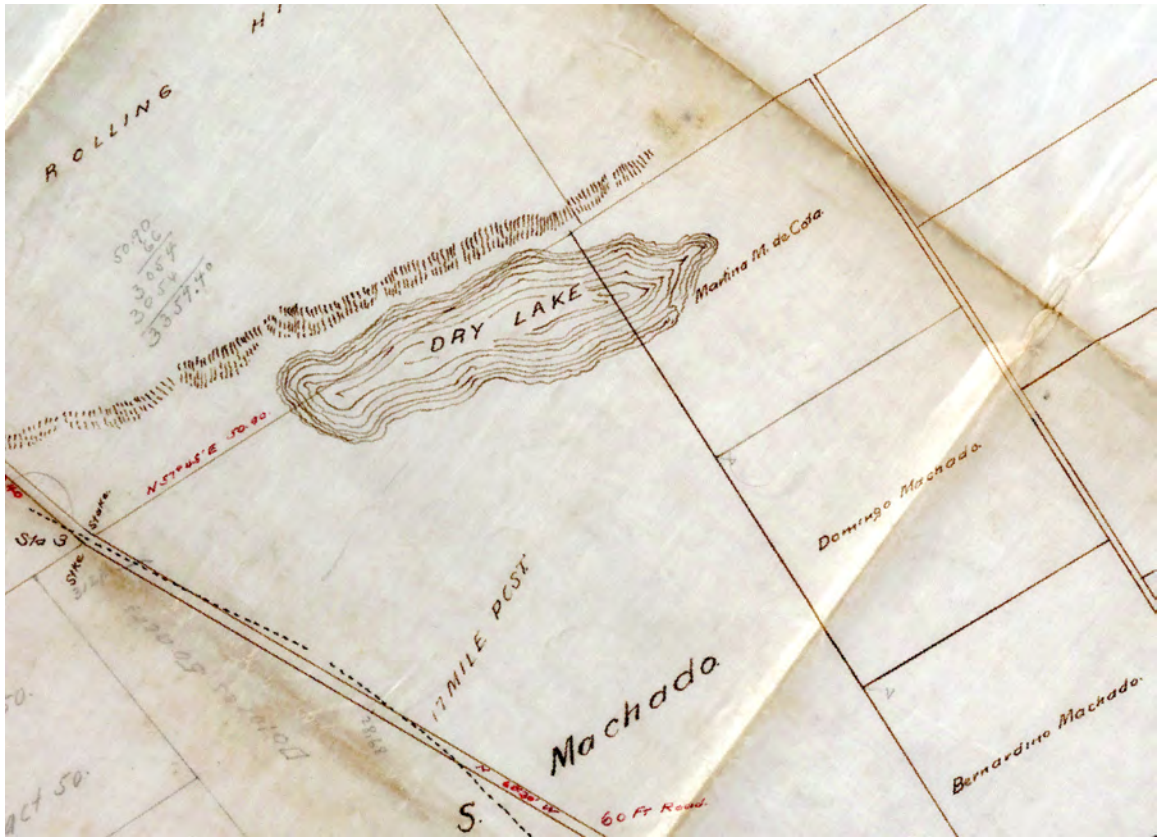


***FIGURE 13:***
*Map (Solano 1893) showing the location of a large vernal pool adjacent to the Ballona Lagoon (Map courtesy of Huntington Library).*

The central northern section of the Ballona Valley is also of special interest due to the area referred to as the "Rodeo de Las Aguas" or the "Round-up of the Waters" (Hancock 1949). In this area, streams ran down from the Santa Monica foothills and converged "each rainy season in a broad swamp or cienega" (Benedict 1934, Wilson 1959). This locale marks the northernmost extent of a band of wetland habitat that transitions into the La Cienega system to the south. Valley freshwater


***FIGURE 14:***
*Early diseño map showing the location of a spring and fresh water marsh on Rancho de las Aguas. (Map courtesy of the Bancroft Library).*

marsh transitions into wet meadow, which in turn becomes a huge swath of alkali meadow. This area is depicted in detail on historical topographic maps, the Hall irrigation maps, and a diseño of this area (FIGURE 14).

The remaining wetland habitat covering the northeastern sections of the Ballona Valley contained a few pockets of valley freshwater marsh, which, in most cases, were surrounded by wet meadow, the most prevalent habitat type in the area. As Ballona Valley's wet meadows were not clearly and frequently depicted on multiple data sources, polygons were primarily derived from the 1916 soil map offering lower levels of certainty across all categories.

Eleven springs were mapped within the Ballona Valley region. Although most of the springs were not coincident with other wetland features, they were often in close proximity. The absence of a direct physical connection between the springs and other wetlands features

may have been due to the limitations in spatial accuracy of historical data sources, rather than the true locations of the feature themselves. These springs likely played an important role in the early settlement patterns and ranching practices of this region as most settlements were typically located near reliable water sources. FIGURE 15 shows the use of one of these springs for aquaculture (notice a man standing in the background tending to the plants).

### *Streams*

There were approximately 120 miles (193 km) of channels in the Ballona Valley region. Ballona and Centinela creeks are the only two streams consistently identified as perennial in the Ballona Watershed (Hansen 1866, CIU 1874, Hall 1888, Lee 1912, LAT 1914, Mathew 1917). These channels would have been associated with a range of facultative to obligate wetland plant species (as documented in herbaria specimens) but only our channel lines (not polygons) represent the extent of this vegetation. So although riparian and associated stream channel vegetation area is not reported separately, it would have been associated with these linear features, depending on the hydroperiod of the stream. The 1902 topographic map indicates that a few other creeks in the northeast section of Ballona Valley may be perennial, but lack of corroborating evidence limited the interpretation of these creeks' hydrology.

The only intermittent channels that continued out of the SAMO Foothills and down across the valley floor were Brown Canyon and the junction of Franklin and Coldwater Canyons (Giffin 1902, Lee 1912). The northeast section of the region also hosts a fairly continuous network of

***FIGURE 15:***
*Photograph of a spring being used as a garden in the Ballona Valley (Photo courtesy of the Huntington Library). Note the man standing in the middle of the garden towards the back tending to the plants.*

streams that are likely dependent on groundwater presence, as are the springs, valley freshwater marsh, and wet meadow habitat present in that area (FIGURE 16).

### *Flora and Fauna*

The plant species from the Ballona Valley supported the presence of freshwater wetlands, riparian elements, and some scrub (Appendix 1). The bird species confirmed this, but with some difficulty distinguishing between the foothills and the valley from the location data provided in the historical data sets. Obligate wetland plant species included whorled

marsh pennywort (*Hydrocotyle verticillata*), water parsely (*Oenanthe samentosa*), seaside heliotrope (*Heliotropium curassavicum*), chairmaker's bulrush (*Schoenoplectus americanus*), prairie bulrush (*Scirpus maritimus*), marsh milk-vetch (*Astragalus pycnostachyus*), swollen duckweed (*Lemna gibba*), common duckweed (*Lemna minor*), floating primrose willow (*Ludwigia peploides*), curlytop knotweed (*Polygonum lapathifolium*), silver weed cinquefoil (*Potentilla anserine*), yerba mansa (*Anemopsis californica*), and seep monkeyflower (*Mimulus guttatus*) (Appendix 1).

### La Cienega

Located at the base of Baldwin Hills, the La Cienega region encompassed approximately 7,012 acres and the complexity of this region was one of the most intriguing aspects of the historical landscape given the contemporary lack of wetlands in this area (FIGURE 17). The historical extent of La Cienaga was large, stretching from present day Hollywood in the north to present day Inglewood in the south; roughly 10 miles in length and up to 3 miles wide in places (Denker 1881). Of the wetlands mapped in this complex, we were highly confident in both interpretation and location certainty. We had less confidence with shape certainty, which reflects the dynamic quality of this complex. In years with high rainfall, this complex was likely large and comprised different types of wetlands (more freshwater ponds and marshes) compared to dry years which probably supported more alkali flats and meadows.

#### *Wetlands*

This wetland complex was dominated by alkali meadow (58%), alkali flat (16%), and valley freshwater marsh (16%; TABLE 5). The internal

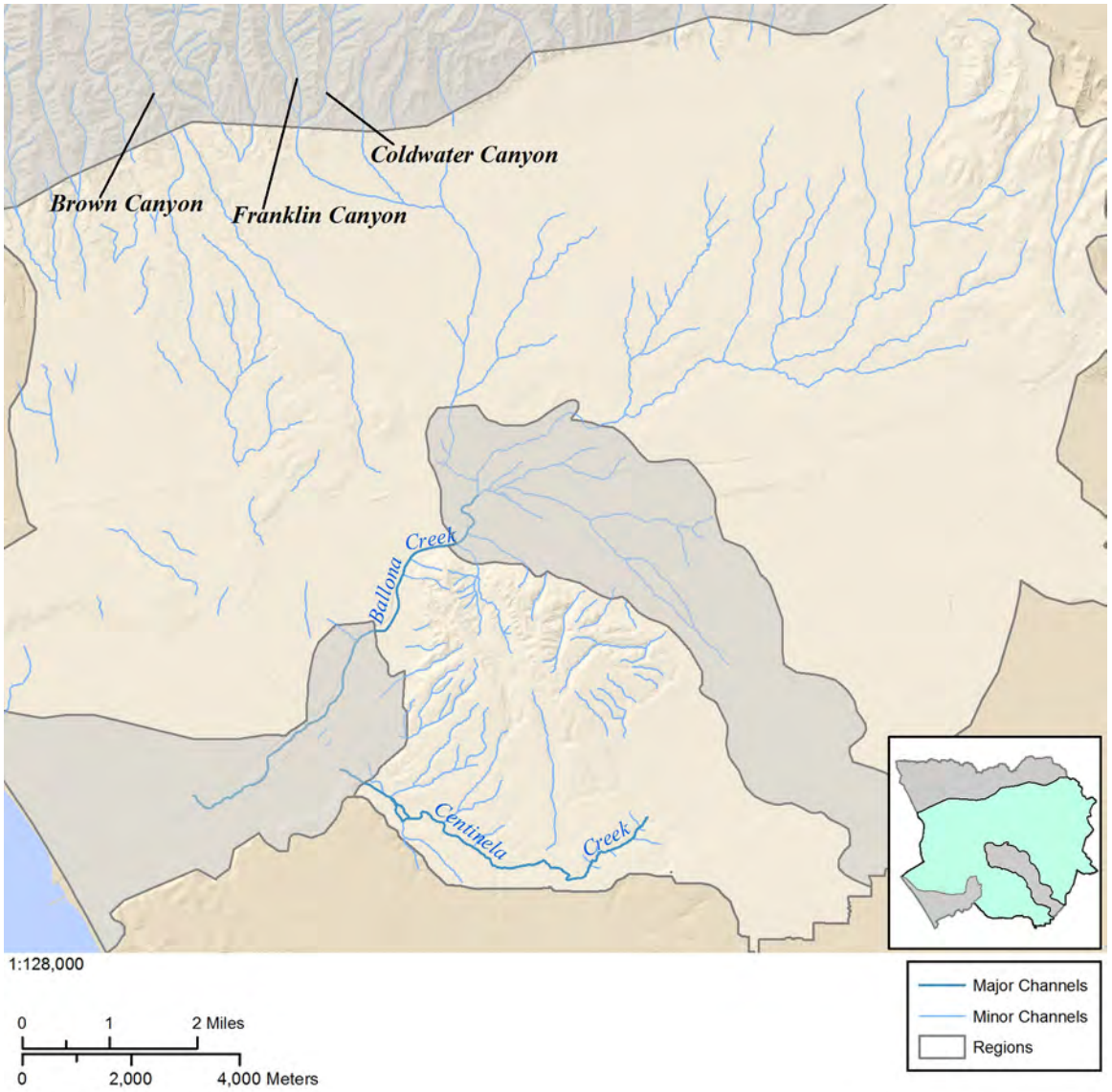


***FIGURE 16:*** *Distribution of creeks and streams in the Ballona Valley region.*

habitat was dominated by valley freshwater marsh and alkali flat, and was surrounded by vast expanses of alkali meadow with wet meadow habitat dotting the periphery of the complex (FIGURE 18, FIGURE 19). The habitat composition also included numerous willow thickets and perennial freshwater ponds (as supported by the Solano Reeves maps). The southwest region of the system is host to a vernal pool complex as indicated by Hansen court dockets (Abila 1859) and consistent with those documented immediately to the south by Mattoni and Longcore (1997).

### *Streams*

Approximately 18 miles (29 km) of streams and sloughs traversed the La Cienega region. We did not designate many permanent channels in this complex because data indicated that it was extremely dynamic; channels appeared to be continually changing location and even disappearing, as the greater wetland complex engulfed them during very wet seasons (Reagan 1915). An absence of any references to channel names in historical sources appears to support this theory.

| HABITAT CLASSIFICATION | UNIQUE WETLANDS | ACRES | HECTARES |
|---|---|---|---|
| ALKALI FLAT | 4 | 1137 | 427 |
| ALKALI MEADOW | 17 | 4085 | 1434 |
| PERENNIAL FRESHWATER POND | 5 | 68 | 28 |
| VALLEY FRESHWATER MARSH | 21 | 1114 | 449 |
| VERNAL POOL | 3 | 63 | 26 |
| WET MEADOW | 5 | 404 | 164 |
| WILLOW THICKET | 11 | 141 | 57 |
| TOTALS | 66 | 7012 | 2585 |

***TABLE 5:***
*Habitat types mapped in the La Cienega region of the Ballona Watershed.*

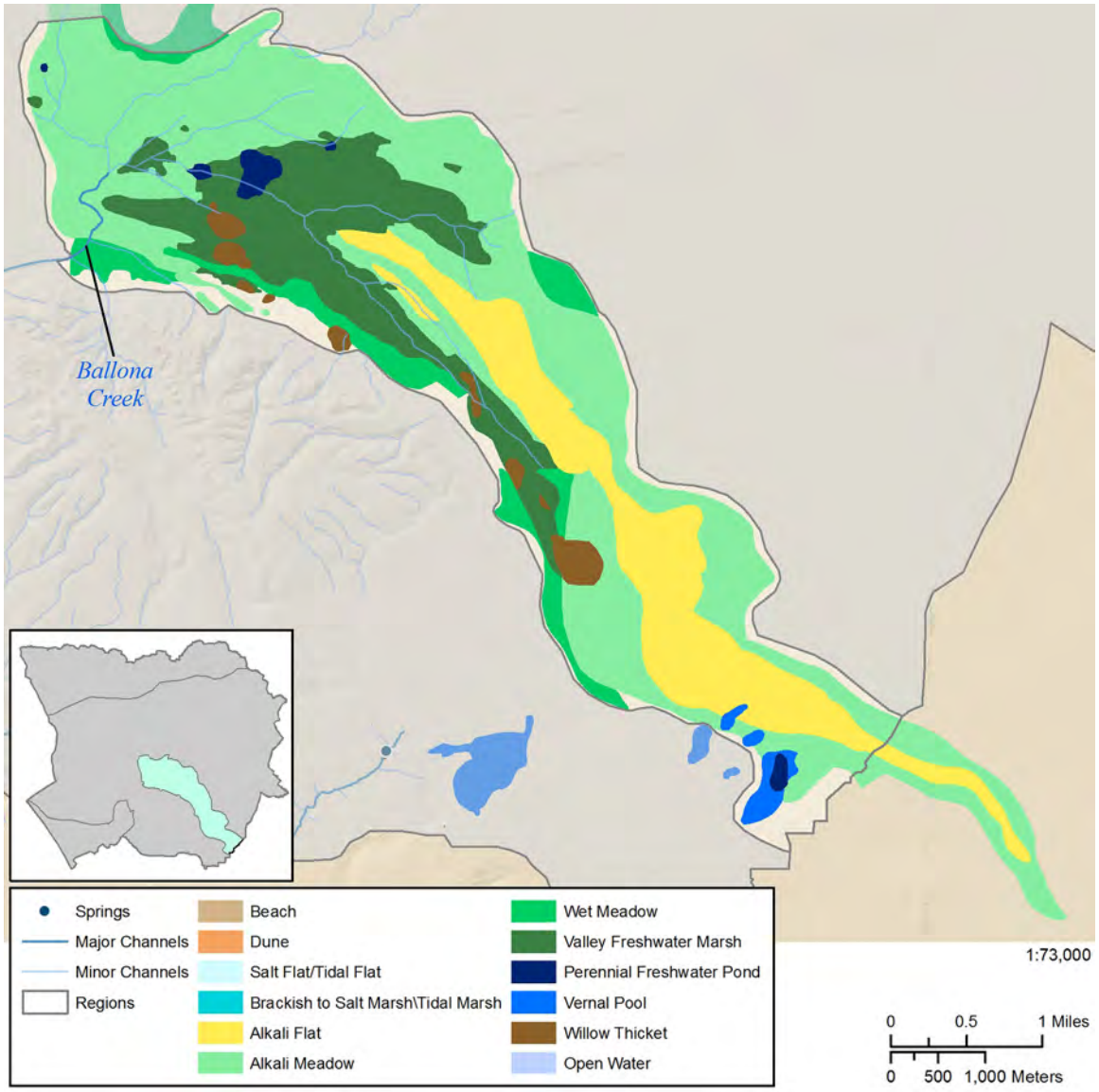


***FIGURE 17:*** *Wetlands mapped within the La Cienega region. This complex extended beyond the watershed boundary.*

### *Flora and Fauna*

Botanical records from La Cienega conclusively document the presence of extensive perennial and ephemeral freshwater wetlands and alkali meadows in this region (Appendix 2). Records indicated that La Cienega supported many types of sedge and rushes, and even rare species like marsh milk-vetch (Astragalus pycnostachyus var. lanosissimus; once thought extinct) and interestingly also Braunton's milk-vetch (Astragalus brauntonii). The language on the herbarium records describes the region mostly as "Cienega," but sometimes also "Cienega swamp," "Culver City marshland," and "marsh at Cienega." Bird nest records from our target species included Black Phoebe ("Under bridge across from Baldwin's sloughs") and Common Yellowthroat ("Tules, in swamp").

### Ballona Lagoon

The Ballona Lagoon was a large (4,288 acres) and diverse system. The historical lagoon extended from the base of the bluffs to the south all the way to the intersection of Main St and Abbot Kinney to the north, and as far east as Overland Blvd. Historical narratives, such as Reagan (1917), provide strong support to suggest that the size of the greater wetland system was dynamic and heavily influenced by winter rains: "This area was called Ballona Swamp. In rainy winters Ballona Swamp extended over nearly all the low ground as far back as the present site of Culver City, then called "The Palms," and running over to the Inglewood Mesa, an area about ten miles square." (Chambers 1936).

This area encompassed a tremendous diversity of wetland habitat types, more so than any region within the study area (TABLE 6). This is likely due to the juxtaposition of freshwater and brackish environments

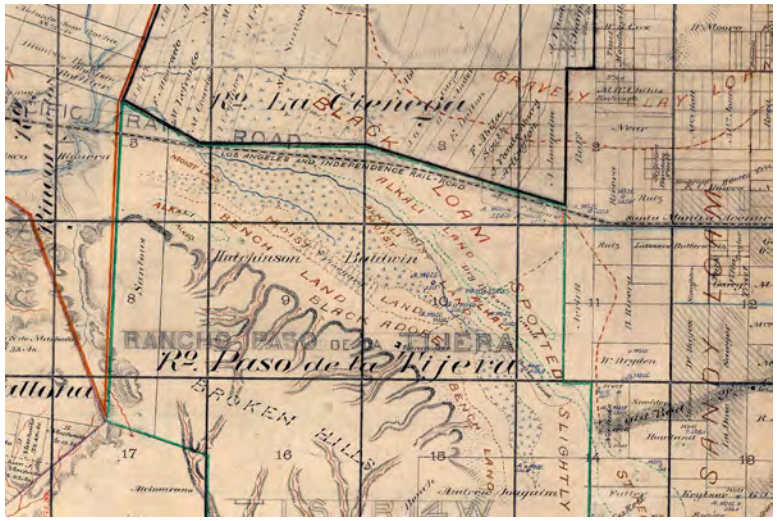


***FIGURE 18:*** *Hall irrigation map (1888), notice the reference to alkali land. [courtesy of California State Archives].*

***FIGURE 19:*** *Alkali lands in the La Cienega wetland complex at the base of Baldwin Hills (photo courtesy of Los Angeles Public Library, date unknown).*

and the complexity of the hydrodynamics of the system. This complexity was likely enhanced by the change in the volume of freshwater input and the assumed frequency of mouth opening associated with the re-alignment of the Los Angeles River. T-sheet analysis by Grossinger et al. (2011) focused specifically on mapping habitats as depicted by the T-sheet and did not include additional sources. As with other historical ecology studies (e.g., Beller et al. 2011), the use of additional historical data sources revealed additional information. For example, our research determined that the use of the term tidal in reference to habitat associated with the lagoon was too limiting. Our data suggests that at most times, this low energy system had only moderate or no tidal influence and was dominated by freshwater inputs from the watershed (see Jacobs et al. 2011). The textual sources indicate complete closure of the system from the ocean through substantial portions of the year, opening only during periods of significant rainfall (LAT 1887; see discussion in Jacobs et al. 2011). Consequently, we broadened our classification from tidal flat to salt flat/tidal flat and from tidal marsh to brackish to salt marsh/tidal marsh. In addition, we were able to map transitional estuarine–upland habitats not mapped on the T-sheet project such as the presence of willow groves and akali flats located at the confluence Centinela Creek and the inland extent of the estuary.

| HABITAT CLASSIFICATION | UNIQUE WETLANDS | ACRES | HECTARES |
|---|---|---|---|
| ALKALI FLAT | 1 | 147 | 59 |
| ALKALI MEADOW | 4 | 1118 | 481 |
| BEACH | 2 | 159 | 64 |
| DUNE | 8 | 187 | 76 |
| OPEN WATER* | 8 | 96 | 39 |
| PERENNIAL FRESHWATER POND | 1 | 5 | 2 |
| SALT FLAT/TIDAL FLAT | 15 | 423 | 171 |
| BRACKISH TO SALT MARSH/TIDAL MARSH | 18 | 1239 | 498 |
| WET MEADOW | 5 | 562 | 228 |
| WILLOW THICKET | 1 | 282 | 115 |
| TOTALS | 63 | 4288 | 1733 |

**DOES NOT INCLUDE PACIFIC OCEAN*

***TABLE 6:***
*Distribution of habitats associated with the Ballona Lagoon.*

### *Wetlands*

The historical mouths of both Ballona and Centinela Creeks emptied into the lagoon complex at different locations (Lee 1912); the Centinela tributary further inland into a large willow thicket, and the Ballona tributary closer to the coast into the brackish to salt/tidal marsh habitat (FIGURE 20). The 1825 migration of the Los Angeles River dramatically reduced flow into the lagoon area and the wetland distribution that developed since that time likely reflected a process of equilibration to this new flow regime. As a consequence, efforts to obtain consistent corroborating evidence for the system were difficult. The documentation that exists, aside from the USCS T-sheet (Chase 1876), often provided conflicting and broad descriptions as to the historical habitat and ecological communities in the complex. Apparent inconsistencies in the historical record may have also resulted from the dynamism inherent in coastal lagoons leading to different physical and biological conditions at different points in time. What is clear is that the system was an expansive marshy area that supported both abundant wildlife, and later on, extensive human activity such as fishing, hunting and boating (Ingersoll 1908, Adler 1969, Wittenberg 1973).

Approximately half of the aggregate Ballona Lagoon area consisted of a freshwater and tidally affected saltmarsh and brackish habitats that transitioned into a more alkaline/freshwater system about 1.5 miles (2.4 km) inland. Historical habitat of the Ballona Lagoon coastal complex consisted of substantial amounts of brackish to salt marsh/tidal marsh habitat (29%), followed by salt flat/tidal flat (10%). Open water made up less than 3 percent of the lagoon and one of the more salient features of the complex was a long but narrow strip of open water referred to by some as a "lake" at what we call today Del Rey/Ballona Lagoon (Sheridan 1887). This strip of open water periodically emptied into the ocean at the documented location of seasonal tidal access (FIGURE 22). We found no evidence that the lagoon remained perennially open, but rather the textual sources indicate that access to the ocean depended on hydraulic forces during any given year (LAT 1887, Sheridan 1887, Hansen and Jackson 1889, Solano 1893). The migration of the Los Angeles River away from the lagoon transitioned the system into a lower energy system where only on rare occasions was there enough freshwater flow from Ballona Creek to break through the buildup of sediment along the coast. As a result, gradual build up of sediment around the terminus of the previous estuary formed dunes and created this "trapped" lake-like feature. The coastal dunes, which occupied four percent of the Ballona Lagoon coastal complex, played a significant role in the formation of the lake and the limited tidal access (see Jacobs et al. 2011).

Inland areas of the Ballona Lagoon were dominated by alkali meadow, with less wet meadow. Water from Centinela Creek also flooded into this area contributing to the formation of an extensive willow thicket which covered approximately 280 acres. Diseno maps

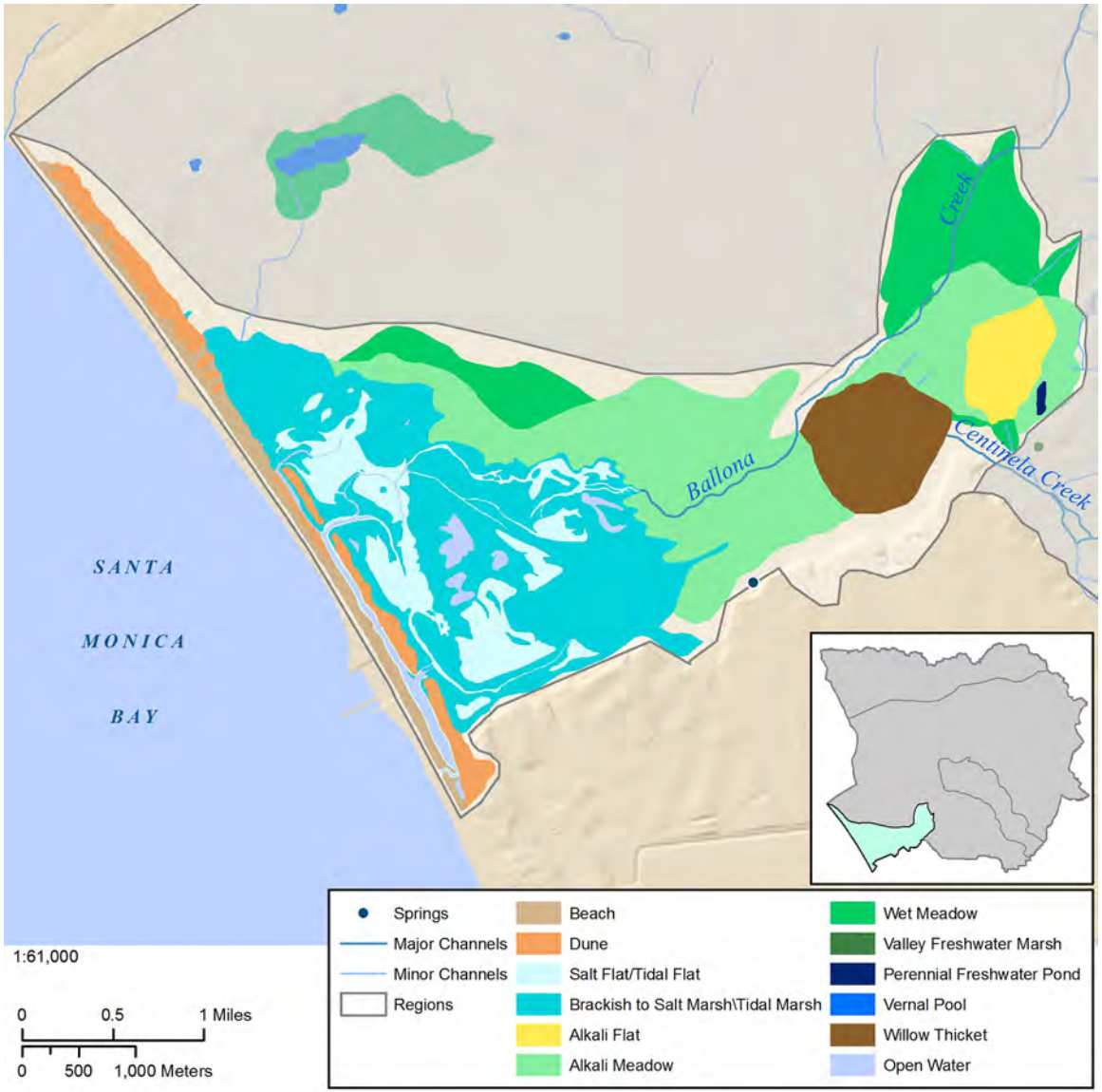


***FIGURE 20:*** *Wetlands mapped in the Ballona Lagoon region of the Ballona Watershed.*

**FIGURE 21:**
*Man boating on Ballona Lake (photo courtesy of Los Angeles Public Library, date unknown). Notice the dunes surrounding the lake.*

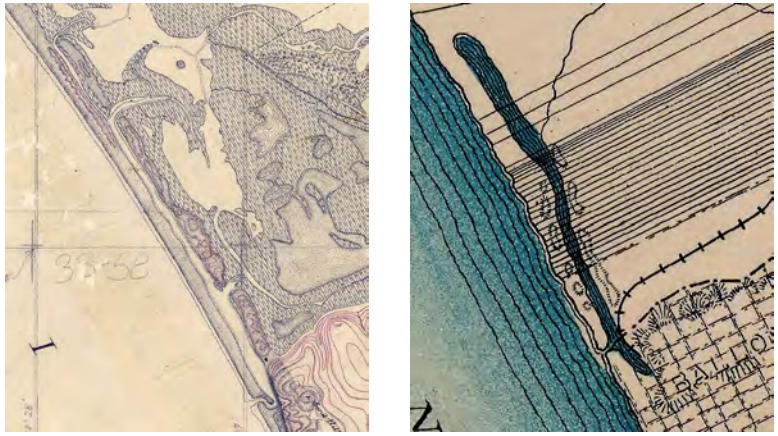

**FIGURE 22:**
*Maps demonstrating the location of Ballona Lagoon (a) Chase T-sheet (1876) and b) Hall irrigation map (1887).*

(FIGURE 23) clearly depict a large willow grove or thicket, and ancillary data sources such as the 1894 topographic map and alkali soils map support the delineation and classification of this wetland habitat. Alkali flat comprises 147 acres of the inland lagoon, and a single five-acre freshwater pond sits in a small depression on the southeastern edge of the system.

### *Streams and Tidal Channels*

The coastal region of the Ballona Lagoon contained extensive drainage channel networks as illustrated in the USCS T-sheet (Chase 1876). These channel networks served in part to connect salt flat/tidal flat habitat, and ultimately drain into the long "lake" described previously. Ballona and Centinela creeks were the only substantial freshwater channels to enter the upper lagoon system. Ballona Creek terminated at the head of the tidal portion of the complex. Centinela Creek entered the upper lagoon region just south of Ballona Creek.

### *Flora*

Herbarium records provide a picture of freshwater to brackish and some saltwater wetlands in this region (Appendix 3). Species of perennially open tidal wetlands (e.g., cordgrass) are not found in the older records. Rather, brackish, freshwater, and salt marsh species are represented in the records. All of the dune species are also recorded in this region as these habitats interweave with the wetlands. Of the riparian bird species we surveyed, Song Sparrows are recorded nesting in the tules at the Lagoon. The brids of the lagoon region and the changes in composition over time have been discussed previously by Cooper (2006).

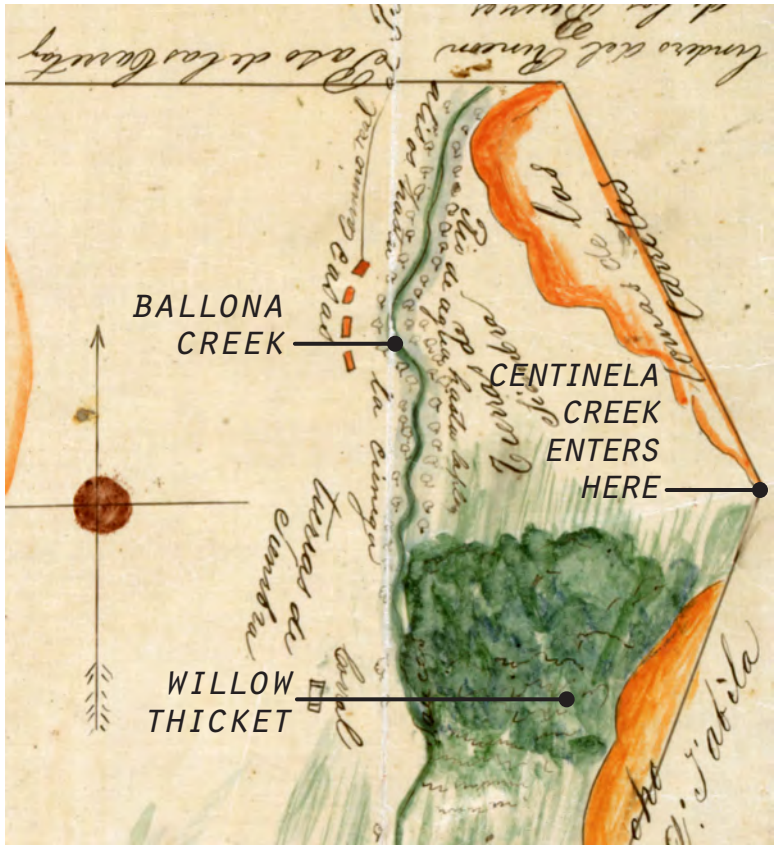


**FIGURE 23:** *Diseno map (circa 1860) demonstrating the location of a willow thicket at the confluence of Ballona and Centinela Creek (not shown on map). (Map courtesy of the Bancroft Library).*

### Santa Monica Mountain Foothills

Located in the northern-most section of the Ballona watershed, the Santa Monica Mountain Foothills (SAMO) are composed entirely of steep canyons (FIGURE 24). This region is dominated by approximately 97 miles of intermittent channels and 29 springs. No other wetland habitat type was documented in historical sources. According to one narrative source, "In the winter time, when the rains came the gullies ran full and overflowing from the mountain. That would only last for two or three days and then it would be gone" (Eckhardt, 1966).

One notable geographic trend is the absence of springs along the western section of the foothill region. This could be the result of local trends in geomorphic composition or displacement caused by faulting. These springs played a notable role in downstream hydrology, where in several locations freshwater wetlands formed at their confluence (particularly in Rodeos de las Aguas as discussed in the Ballona Valley regional description above). Many of these springs persist today and are unique remnant features from the historical landscape (FIGURE 25).

#### *Flora and Fauna*

The flora of the foothills includes the expected chaparral and coastal sage elements, but also documents the presence and diversity of the riparian habitats associated with perennial and ephemeral streams (Appendix 4). Obligate wetland species included cutlear water-parsnip (*Berula erecta*), saltmarsh baccharis (*Baccharis douglasii*), mosquito fern (*Azolla filiculoides*), California tule (*Scirpus californicus*), basket rush (*Juncus textilis*), rigid hedge nettle (*Stachys ajugoides*), valdiva duckweed (*Lemna valdiviana*), California loosestrife (*Lythrum californicum*), willow dock

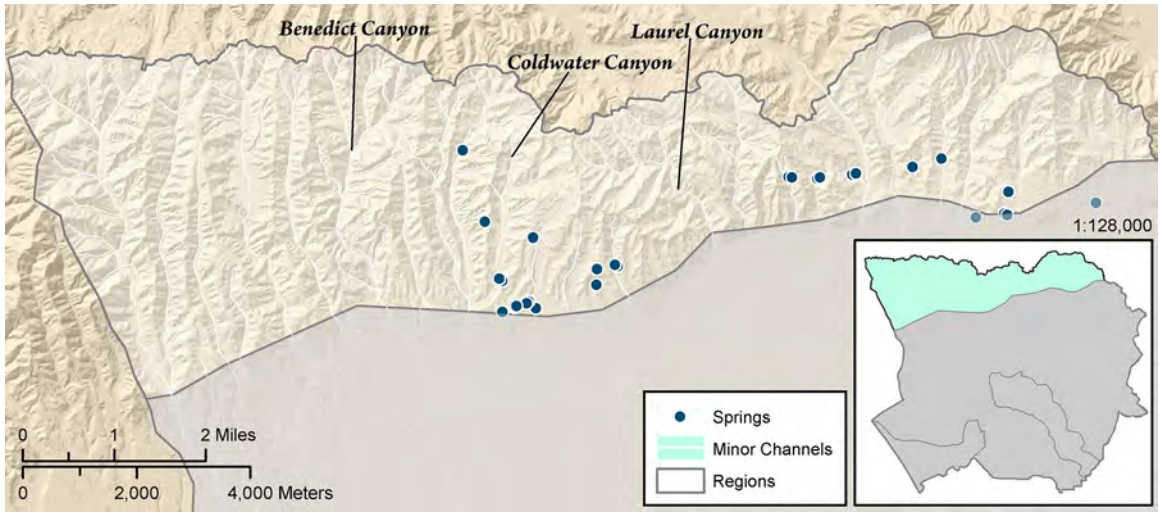


**FIGURE 24:**
*SAMO region showing location of springs and streams.*

**FIGURE 25:**
*Bridge over Franklin Canyon, 1890 (photo courtesy of the Seaver Collection at the Natural History Museum).*

(*Rumex salicifolius*), sago pondweed (*Stuckenia pectinata*), and seep monkey flower (*Mimulus guttatus*). The nest and egg records showed the breeding presence of a range of riparian-associated bird species, including Black-headed Grosbeak (in willows, "grape vine," and sycamores), the now-endangerd Least Bell's Vireo (in sycamores, willows, and "elder"), Yellow Warbler (in willows), House Wren (in willows), Long-tailed Chat ("blackberry vines in willow thicket," "tangle of briars"), Little flycatcher ("thicket, near stream"), and Western Wood-Pewee (in oaks).

### Ballona and Centinela Creeks

Ballona and Centinela creeks were the dominant fluvial features in the Ballona watershed. Both channels played major roles in the formation, development and usage of the surrounding landscape. Likewise, both channels were the primary streams supplying water to the Ballona Lagoon.

#### *Ballona Creek*

Although we classified Ballona Creek as a perennial channel (Hall 1888, Giffin 1902, Adler 1969), we were surprised at how relatively little other historical information was available for the most significant channel in the watershed. In retrospect, we realized that this lack of information was related to the relatively short length of the fluvial channel. Contemporary channelized Ballona Creek is a fairly long hydrologic feature, but the historical span was only 5.7 miles (9.2 km) long prior to 1900, when expansive wetlands dominated the adjacent areas. The two ends of Ballona Creek were effectively subsumed by the La Cienega and Ballona Lagoon wetland complexes and the creek provide surface hydrologic linkage between these two larger wetland complexes (FIGURE 26).

Several smaller drainages flowed into the La Cienega wetlands, but none appeared to be continguous with Ballona Creek; therefore, we interpreted the origin of Ballona Creek proper to be at the outflow of the La Cienega complex.

As indicated by textual descriptions such as the one below and various map sources, the Creek's historical terminus was the Ballona wetland complex (Solano 1868, Carson 1883 Adler 1969). The contemporary location of the channel is remarkably similar but now extends substantially farther upstream and downstream than it did historically.

> *"Out from the central springs of the upper belt - on the ranchos La Brea and Rodeo de las Aguas - Ballona creek gathers its upper perennial waters, leads them south against the base of the Centinela hills. Here, reinforced by a little stream from the east, draining the springs of the ranchos La Cienega and Paso de la Tijera, it turns west and southwest, parallel with the hill's footing, into the Ballona flats and the sea five to six miles away" (Hall 1888).*

Where Ballona Creek flowed independently from the surrounding wetlands, narrative accounts support the description of a clear flowing "stream"lined with sycamores, willows and tules, which, on occasion, inundated the surrounding lands during times of flooding (LAT 1906, Robinson 1942, Wittenberg 1973). Tributaries of Ballona Creek originated far to the north (potentially via the Los Angeles River), and throughout the La Cienega wetland complex (LAT 1906). As described by Hall in 1888.

### *Centinela Creek*

Centinela Creek was largely a spring fed channel just over 4.5 miles (7.2

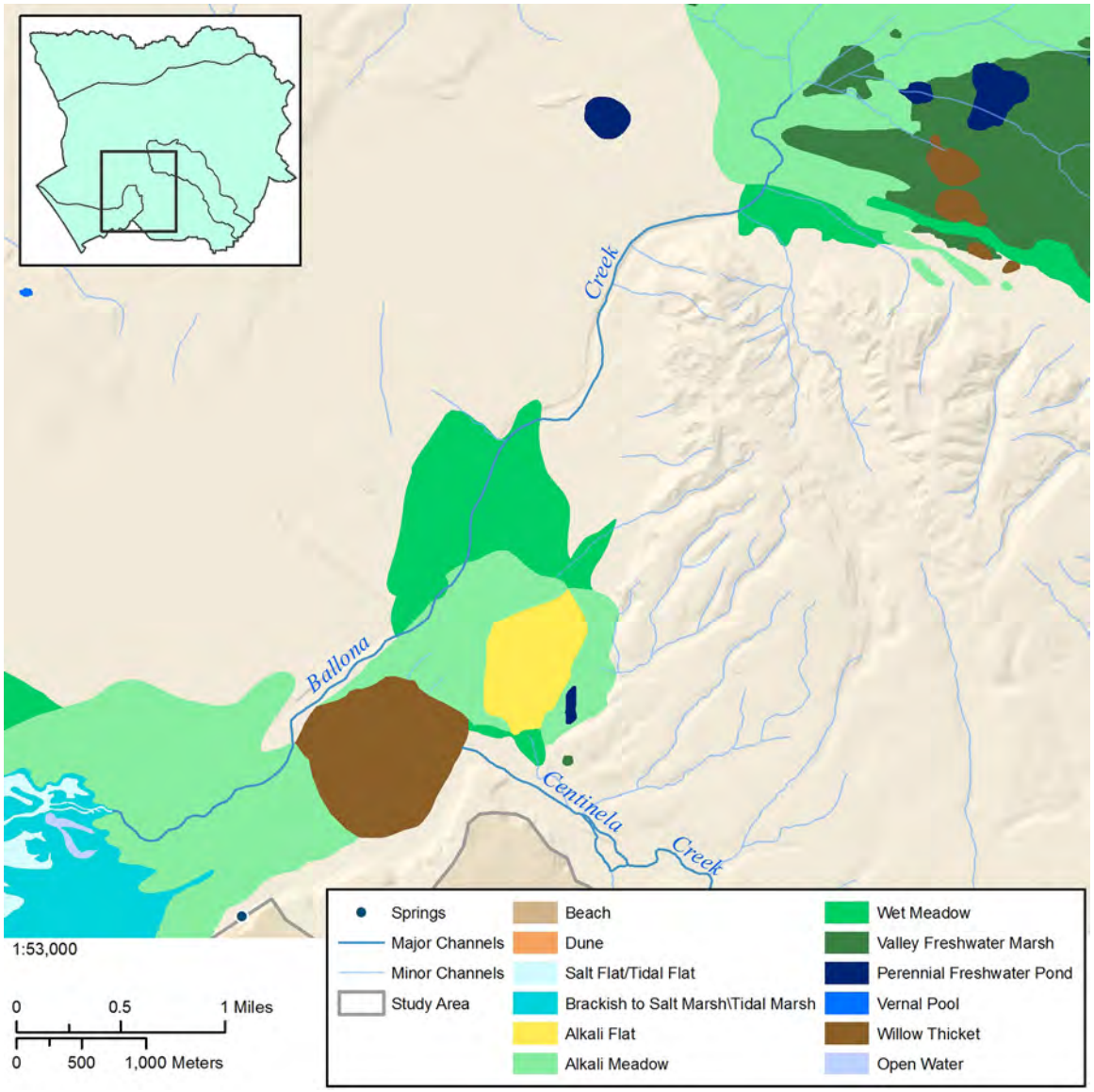


***FIGURE 26:*** *Extent of Ballona Creek.*

km) long, originating at Centinela Springs (FIGURE 27) in the Inglewood area, and draining most of the lands in the surrounding region (Hansen 1867, CIU 1874). As with Ballona Creek, historical documentation was limited, and mainly focuses on the Centinela Springs and surrounding lands of Centinela rather than the Creek itself. Records indicate that the Creek was a perennial stream that provided consistent and ample flow for both domestic and agricultural uses (Hansen 1867, LAT 1873, CIU 1874). The surrounding lands and rich soils of Centinela produced a region ideal for agriculture (LAT 1873, CIU 1874). Several documents described the creek morphology, for example:

> *"The bottom of the Creek from the Spring to St. 16 is from 660 to 1320 feet wide, the banks, from 20 to 30 feet high and steep from station 16 North westerly the bottom widens out and the banks are less abrupt" (Hansen 1867).*

***FIGURE 27:***
*Photograph of Centinela Springs (date unknown, photo courtesy of the Huntington Library).*

Compared to the channelized, short extent of contemporary Centinela Creek, historical Centinela Creek maintained significant sinuosity as it wound its way through the lands of Centinela. Depth and volume of the historical Creek was "over 75 miner's inches of water (3 acre feet/day)" (LAT, 1904). At its terminus, Centinela Creek emptied into the southeastern part of the Ballona Lagoon promoting the formation of a large willow thicket (Lee 1912; FIGURE 28).

### *Flora and Fuana*

The plant records for Ballona Creek are found largely in the Lagoon category for the lower creek, frequently refered to as "Ballona Creek, near Mesmer." Other records are from the relatively short Culver City section between the marshes of the Cienega and the start of the coastal wetland complex. The flora of Centinela Creek was classified with Inglewood because insufficient records speificially identified the creek (Appendix 5). These records also show presence of vernal pools through the presence of spreading navarretia, which is found in vernal pools and alkali grasslands, and is now federally endangered. None of the riparian bird nest records were from this region.

## Overall Confidence in Mapped Polygons

Estimated confidence in the historical analysis was based on three factors; interpretation of data sources, wetland location, and wetland shape. Interpretation of data sources and the shape of wetlands mapped had the highest confidence classifications (FIGURE 29). This is not

| CERTAINTY | INTERPRETATION | SHAPE | LOCATION |
|---|---|---|---|
| HIGH | 9 | 3 | 6 |
| MEDIUM | 91 | 48 | 75 |
| LOW | 0 | 49 | 19 |
| TOTALS [%] | 100 | 100 | 100 |

***FIGURE 29:***
*Percentage of wetland area mapped in each certainty category.*

surprising given the dynamic nature of wetlands in the study area. While a wetland feature may have been persistent on multiple sources it may have been much larger or smaller depending upon the amount of rainfall in any given year.

Certainty estimates based on habitat type were also analyzed. We were the most confident in our interpretation of alkali flats and valley fresh water marsh, both habitat types had certainty classifications of high for 80% of the associated polygons mapped. Salt/tidal flat had the lowest interpretation certainty given the inconsistency of the data sources for the Ballona Lagoon region with regard to tidal influence.

Habitat maps with the greatest confidence in shape and location were; alkali flats, beach, salt/tidal marsh, and salt/tidal flats. Beach, salt/tidal marsh, and salt/tidal flats were all mapped from the detailed USGS T-Sheet (Chase 1876). Given our knowledge of the detail and spatial accuracy of these maps we feel confident in the general location and shape of these features. The location and shape of vernal pools and willow thickets had the lowest confidence classification, with both receiving a classification of low in these categories for about 70% of the polygons mapped. This may reflect the dynamic nature of these habitat types. Vernal pools are heavily influenced by annual precipitation,

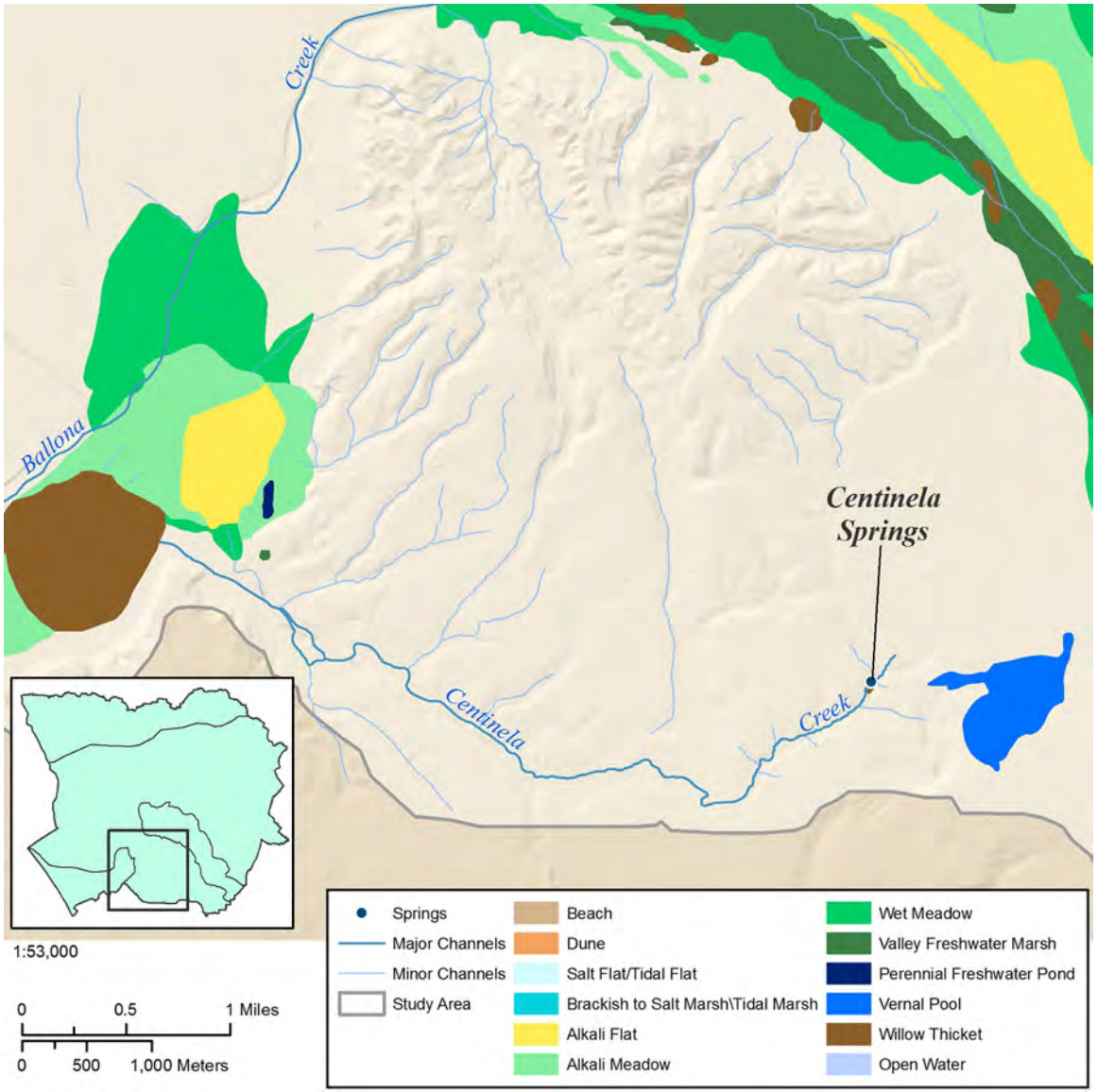


***FIGURE 28:*** *Extent of Centinela Creek.*

therefore during dry years there were likely to be less data sources available documenting their location and shape with consistency. Willow thickets were only found on the early diseno and docket maps, but not present on any other maps from the late 19th century. It may be these thickets were so small they were not identified on more coarse scale maps. Also, it could be they were modified by humans early given their location relative to fresh water and the likely fertile soils they are found on.

## SUMMARY

This research outlined above demonstrates the impressive complexity and diversity that was characteristic of southern California's wetland ecosystems. The dynamism of surface waters in combination with broad shallow aquifers supported vast expanses of alkali flats, alkali meadows, wet meadows, and salt/tidal associated wetlands. Vernal pools, freshwater ponds, and willow groves were also evident, contributing to a tremendous diversity of wetland habitats and consequently large amounts of biodiversity that were historically present within the watershed.

The question remains, how do we bridge this knowledge of the historical Ballona watershed to contemporary landscape management plans? The knowledge of reference conditions often creates considerable discussion about what should be restored, how, and where. We consider this discussion to be an extremely valuable process for restoration of wetlands within this watershed. Clearly, it is unrealistic to have the expectation that systems can be restored to their natural hydrodynamics. The vast alkali meadows of the La Cienega region cannot be realistically restored in the contemporary urbanized landscape. Application of the findings of this study is largely dependent on the extent of human modification, the confidence of historical interpretations, and the intended purpose of restoration. We do not believe the results from this study drive toward one specific endpoint, but may support numerous alternatives for a particular project. In fact, the ensuing discussions about restoration and the iterative process by which further understanding is developed are a valuable outcome from this project.

## NEXT STEPS

This project provides significant insight into the historical landscape of the Ballona watershed. The development of living tools such as the metadata catalog and Ballona Historical Ecology website will hopefully encourage further historical research of wetland resources in this region. As stated at the beginning of this report, we provide a summary of the historical watershed characteristics. This report has a limited focus on the interpretation of data created. We do not interpret or analyze landscape change or discuss implications for management. Future efforts can build upon the foundation provided by this project through the exploration of key issues such as:

1. An analysis of how the ecosystem functioned over time, including factors that affected local and regional habitats. Broadening the temporal scale to include human impact would create a better understanding of the key drivers influencing changes within this unique landscape.
2. A more detailed analysis of the distribution of specific plant communities.
3. An examination of where the greatest losses occurred, both geographically and in terms of specific habitat types.
4. A linkage between our results and potential restoration options in light of current day landscape constraints.

The datasets and living tools provided on the Ballona Historical Ecology website may serve as valuable resources to initiate research in some of these areas.

A common theme running through some of the unanswered questions in this report is the lack of information about the historical ecology of the Los Angeles River. Attempts to understand the history of the Los Angeles River have been made through a variety of mediums (Gumprecht 1999, Elrick and FOLAR 2007). However, there has been little detailed work focusing on the historical wetland habitats, hydrodynamics and associated impacts of the Los Angeles River on connected systems such as the Ballona Watershed and the San Gabriel River watershed. We believe this report offers an opportunity to understand the value and need of such research, not just within the regional landscape but also to better understand the historical ecology of wetland ecosystems throughout Southern California.

In addition to furthering our understanding of the Los Angeles River, there is also a need to better connect the historical ecological research being performed throughout southern California with contemporary landscapes. For example, creating a cross-walk between contemporary and historical habitat classifications would be immensely helpful for restoration purposes. Likewise, the identification of specific sites that could be restored and the options for restoration given the historical ecology would be immensely helpful.

This project has provided a unique opportunity to collaborate across disciplines and within groups currently involved in historical ecology efforts throughout the state of California. We were able to create living tools such as the metadata catalog and the Ballona Historical Ecology website that allow for a coordinated exchange of information in both data collection efforts and visualization of the study area. These tools set a precedent for future research and lend to further development on future projects.

## ACKNOWLEDGEMENTS

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Additional information on historical ecology in southern California, can be obtained from **www.csun.edu/~centergs/**. Digital products associated with this project can be obtained at **www.ballonahe.org**.

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## APPENDIX 1.
### PLANT SPECIES RECORDED IN THE BALLONA VALLEY REGION

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Apiaceae** | *Hydrocotyle verticillata* | whorled marsh pennywort | OBL |
| **Apiaceae** | *Oenanthe sarmentosa* | water parsley | OBL |
| **Apiaceae** | *Tauschia arguta* | southern umbrellawort | |
| **Asteraceae** | *Ambrosia acanthicarpa* | annual bursage | |
| **Asteraceae** | *Ambrosia psilostachya* | western ragweed | FAC |
| **Asteraceae** | *Ambrosia psilostachya var. californica* | western ragweed | FAC |
| **Asteraceae** | *Chrysothamnus nauseosus* | | |
| **Asteraceae** | *Conyza canadensis* | Canada horseweed | FAC |
| **Asteraceae** | *Corethrogyne filaginifolia* | common sandaster | |
| **Asteraceae** | *Corethrogyne filaginifolia var. virgata* | common sandaster | |
| **Asteraceae** | *Deinandra fasciculata* | common tarweed | |
| **Asteraceae** | *Erigeron foliosus* | leafy fleabane | |
| **Asteraceae** | *Gnaphalium leucocephalum* | white-headed cudweed | |
| **Asteraceae** | *Gnaphalium stramineum* | Small-flowered cudweed | |
| **Asteraceae** | *Grindelia camporum* | Great Valley gumweed | |
| **Asteraceae** | *Grindelia hirsutula* | hairy gumweed | FACW |
| **Asteraceae** | *Helianthus annuus* | common sunflower | FAC |
| **Asteraceae** | *Helianthus annuus subsp. lenticularis* | common sunflower | FAC |
| **Asteraceae** | *Hemizonia australis* | Asteraceae | |
| **Asteraceae** | *Heterotheca grandiflora* | telegraphweed | |
| **Asteraceae** | *Isocoma menziesii var. vernonioides* | white-flowered goldenbush | FAC |
| **Asteraceae** | *Lasthenia californica* | California goldfields | FACW |
| **Asteraceae** | *Lasthenia glabrata subsp. coulteri* | yellowray goldfields | FACW |
| **Asteraceae** | *Layia glandulosa* | White tidy-tips | |
| **Asteraceae** | *Lepidospartum squamatum* | scalebroom | |
| **Asteraceae** | *Malacothrix saxatilis var. tenuifolia* | cliff aster | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Asteraceae** | *Pseudognaphalium leucocephalum* | white headed cudweed | |
| **Asteraceae** | *Pseudognaphalium microcephalum* | | |
| **Asteraceae** | *Senecio californicus* | California Butterweed | |
| **Asteraceae** | *Senecio flaccidus var. douglasii* | Douglas' shrubby ragwort | |
| **Asteraceae** | *Stephanomeria exigua subsp. coronaria* | milk aster | |
| **Asteraceae** | *Uropappus lindleyi* | silver puffs | |
| **Asteraceae** | *Xanthium spinosum* | spiny cocklebur | FAC |
| **Boraginaceae** | *Amsinckia intermedia* | Eastwood's fiddleneck | |
| **Boraginaceae** | *Cryptantha muricata* | prickly cryptantha | |
| **Boraginaceae** | *Heliotropium curassavicum var. oculatum* | seaside heliotrope | OBL |
| **Boraginaceae** | *Plagiobothrys nothofulvus* | rusty popcornflower | FAC |
| **Brassicaceae** | *Erysimum capitatum* | western wallflower | |
| **Brassicaceae** | *Lepidium oblongum* | Wayside peppergrass | |
| **Brassicaceae** | *Lepidium strictum* | prostrate pepper grass | |
| **Cactaceae** | *Opuntia oricola* | chaparral pricklypear | |
| **Caryophyllaceae** | *Silene laciniata subsp. major* | Indian pink | |
| **Chenopodiaceae** | *Atriplex serenana* | saltscale | FAC |
| **Chenopodiaceae** | *Suaeda calceoliformis* | Pursh seepweed | FACW+ |
| **Chenopodiaceae** | *Suaeda moquinii* | bush seepweed | FAC |
| **Cistaceae** | *Helianthemum scoparium var. vulgare* | common sun-rose | |
| **Convolvulaceae** | *Calystegia macrostegia subsp. cyclostegia* | south coast morning-glory | |
| **Convolvulaceae** | *Cressa truxillensis* | spreading alkaliweed | FACW |
| **Cupressaceae** | *Calocedrus decurrens* | incense cedar | |
| **Cuscutaceae** | *Cuscuta campestris* | field dodder | |
| **Cyperaceae** | *Carex praegracilis* | clustered field sedge | FACW- |
| **Cyperaceae** | *Cyperus eragrostis* | tall flatsedge | FACW |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Cyperaceae** | *Cyperus esculentus* | Yellow nutgrass | FACW |
| **Cyperaceae** | *Schoenoplectus americanus* | chairmaker's bulrush | OBL |
| **Cyperaceae** | *Scirpus maritimus* | prairie bulrush | OBL |
| **Euphorbiaceae** | *Chamaesyce albomarginata* | rattlesnake weed | |
| **Euphorbiaceae** | *Croton californicus* | California croton | |
| **Fabaceae** | *Astragalus pycnostachyus var. lanosissimus* | marsh milk-vetch | OBL |
| **Fabaceae** | *Astragalus trichopodus var. lonchus* | Santa Barbara milk-vetch | |
| **Fabaceae** | *Lathyrus vestitus subsp. laetiflorus* | wild sweetpea | |
| **Fabaceae** | *Lotus unifoliolatus* | American bird's foot trefoil | |
| **Fabaceae** | *Lupinus excubitus var. hallii* | Hall's bush lupine | |
| **Fabaceae** | *Lupinus longifolius* | long leaf bush lupine | |
| **Fabaceae** | *Pickeringia montana* | chaparral pea | |
| **Fabaceae** | *Trifolium ciliolatum* | foothill clover | |
| **Fabaceae** | *Trifolium obtusiflorum* | creek clover | FAC |
| **Grossulariaceae** | *Ribes aureum var. gracillimum* | golden currant | FACW |
| **Hydrophyllaceae** | *Nemophila menziesii* | baby blue eyes | |
| **Hydrophyllaceae** | *Phacelia distans* | common phacelia | |
| **Hydrophyllaceae** | *Phacelia minor* | California bluebell | |
| **Iridaceae** | *Sisyrinchium bellum* | blue-eyed grass | FAC |
| **Juncaceae** | *Juncus ambiguus* | saline toad rush | FACW |
| **Lamiaceae** | *Stachys ajugoides var. rigida* | rigid hedge nettle | |
| **Lemnaceae** | *Lemna gibba* | swollen duckweed | OBL |
| **Lemnaceae** | *Lemna minor* | common duckweed | OBL |
| **Liliaceae** | *Bloomeria crocea var. crocea* | common goldenstar | |
| **Loasaceae** | *Mentzelia affinis* | yellow blazing star | |
| **Myricaceae** | *Morella californica* | Myricaceae | FAC |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Nyctaginaceae** | *Abronia umbellata* | purple sand verbena | |
| **Onagraceae** | *Camissonia cheiranthifolia subsp. suffruticosa* | beach evening-primrose | |
| **Onagraceae** | *Epilobium canum subsp. canum* | California fuchsia | |
| **Onagraceae** | *Ludwigia peploides subsp. peploides* | floating primrose willow | OBL |
| **Papaveraceae** | *Platystemon californicus* | cream cups | |
| **Papaveraceae** | *Romneya coulteri* | Coulter's matilija poppy | RARE |
| **Plantaginaceae** | *Plantago erecta* | California plantain | |
| **Platanaceae** | *Platanus racemosa* | western sycamore | FACW |
| **Poaceae** | *Bromus grandis* | tall brome | |
| **Poaceae** | *Elymus condensatus* | giant wild rye | FACU |
| **Poaceae** | *Elymus triticoides* | alkali rye | FAC |
| **Poaceae** | *Eragrostis pectinacea* | tufted lovegrass | FAC |
| **Poaceae** | *Eragrostis pectinacea var. pectinacea* | tufted lovegrass | FAC |
| **Poaceae** | *Leptochloa panicea ssp. brachiata* | mucronate sprangeltop | |
| **Poaceae** | *Leptochloa uninervia* | Mexican sprangletop | FACW |
| **Poaceae** | *Leymus triticoides* | beardless wildrye | FAC |
| **Poaceae** | *Nassella cernua* | nodding needlegrass | |
| **Poaceae** | *Nassella pulchra* | purple needlegrass | |
| **Poaceae** | *Phalaris lemmonii* | Lemmon's canarygrass | FACW- |
| **Poaceae** | *Phalaris minor* | littleseed canarygrass | |
| **Polygonaceae** | *Polygonum lapathifolium* | curlytop knotweed | OBL |
| **portulacaceae** | *Calandrinia ciliata* | red maids | FACU |
| **Primulaceae** | *Dodecatheon clevelandii* | padre's shootingstar | |
| **Rosaceae** | *Potentilla anserina* | silver weed cinquefoil | OBL |
| **Rosaceae** | *Potentilla glandulosa* | Common cinquefoil | FAC |
| **Salicaceae** | *Salix lasiolepis* | arroyo willow | FACW |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Saururaceae** | *Anemopsis californica* | yerba mansa | OBL |
| **Scrophulariaceae** | *Castilleja exserta* | purple owl's clover | |
| **Scrophulariaceae** | *Kochia scoparia* | climbing penstemon | |
| **Scrophulariaceae** | *Linaria canadensis var. texana* | rough seeded blue toad flax | |
| **Scrophulariaceae** | *Mimulus guttatus* | seep monkeyflower | OBL |
| **solanaceae** | *Datura wrightii* | Jimson weed | |
| **Ulmaceae** | *Celtis laevigata* | western hackberry | |
| **Urticaceae** | *Hesperocnide tenella* | western stinging nettle | |
| **Verbenaceae** | *Verbena lasiostachys var. lasiostachys* | Common verbena | FAC |

## APPENDIX 2.
### FLORA OF THE LA CIENEGA REGION AS DOCUMENTED IN HERBARIUM SPECIMENS

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Apiaceae** | *Oenanthe sarmentosa* | water parsley | OBL |
| **Asclepiadaceae** | *Asclepias fascicularis* | narrow leaf milkweed | FAC |
| **Asteraceae** | *Ambrosia acanthicarpa* | annual bursage | |
| **Asteraceae** | *Baccharis douglasii* | saltmarsh baccharis | OBL |
| **Asteraceae** | *Helianthus nuttallii subsp. parishii* | Los Angeles sunflower | FACW |
| **Asteraceae** | *Hemizonia australis* | Asteraceae | |
| **Asteraceae** | *Isocoma menziesii var. menziesii* | white-flowered goldenbush | FAC |
| **Asteraceae** | *Pluchea odorata* | salt marsh fleabane | |
| **Asteraceae** | *Pseudognaphalium stramineum* | Small flowered cudweed | FAC |
| **Asteraceae** | *Symphyotrichum defoliatum* | San Bernardino aster | |
| **Asteraceae** | *S. lanceolatum var. hesperium [=Aster hesperius]* | | |
| **Asteraceae** | *Xanthium spinosum* | spiny cocklebur | FAC |
| **Brassicaceae** | *Hutchinsia procumbens* | prostrate hutchinsia | FAC |
| **Brassicaceae** | *Nasturtium gambelii* | Gambel's yellowcress | OBL |
| **Chenopodiaceae** | *Atriplex argentea var. mohavensis* | mohave saltbush | FAC |
| **Chenopodiaceae** | *Atriplex serenana var. davidsonii* | saltscale | FAC |
| **Chenopodiaceae** | *Atriplex triangularis* | spear leaved saltbrush | |
| **Chenopodiaceae** | *Salicornia virginica* | pickleweed | OBL |
| **Chenopodiaceae** | *Suaeda moquinii* | bush seepweed | FAC |
| **Cornaceae** | *Cornus californica* | Creek Dogwood | FACW |
| **Cornaceae** | *Cornus occidentalis* | Creek Dogwood | FACW |
| **Cyperaceae** | *Carex barbarae* | Santa Barbara sedge | FACW |
| **Cyperaceae** | *Carex praegracilis* | clustered field sedge | FACW |
| **Cyperaceae** | *Carex schottii* | Schott's sedge | OBL |
| **Cyperaceae** | *Cyperus esculentus* | Yellow nutgrass | FACW |
| **Cyperaceae** | *Cyperus niger var. capitatus* | black flatsedge | FACW |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Cyperaceae** | *Scirpus californicus* | California tule | OBL |
| **Euphorbiaceae** | *Chamaesyce serpens* | creeping spurge | FAC |
| **Euphorbiaceae** | *Euphorbia serpens* | creeping spurge | FAC |
| **Fabaceae** | *Astragalus brauntonii* | Braunton's milk vetch | |
| **Fabaceae** | *Astragalus funereus* | black milk vetch | |
| **Fabaceae** | *Astragalus pycnostachyus var. lanosissimus* | marsh milk-vetch | OBL |
| **Fabaceae** | *Lotus purshianus var. purshianus* | Spanish clover | |
| **Juncaceae** | *Juncus mexicanus* | mexican rush | FACW |
| **Juncaceae** | *Juncus phaeocephalus* | brownhead rush | FACW |
| **Lamiaceae** | *Stachys albens* | whitestem hedgenettle | OBL |
| **Liliaceae** | *Bloomeria crocea var. crocea* | common goldenstar | |
| **Onagraceae** | *Epilobium ciliatum* | fringed willowherb | FACW |
| **Onagraceae** | *Epilobium ciliatum subsp. ciliatum* | fringed willowherb | FACW |
| **Onagraceae** | *Ludwigia peploides subsp. peploides* | floating primrose willow | OBL |
| **Poaceae** | *Setaria parviflora* | marsh bristlegrass | |
| **Polygonaceae** | *Polygonum punctatum* | Common water smartweed | OBL |
| **Rosaceae** | *Potentilla anserina var. grandis* | silver-weed cinquefoil | OBL |
| **Rubiaceae** | *Galium trifidum var. pacificum* | Pacific Bedstraw | FACW |
| **Typhaceae** | *Sparganium erectum subsp. stoloniferum* | simplestem bur-reed | OBL |

## APPENDIX 3.
### PLANT SPECIES RECORDED AT BALLONA LAGOON FROM HERBARIUM RECORDS

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Aizoaceae** | *Sesuvium verrucosum* | western sea-purslane | |
| **Alismataceae** | *Sagittaria montevidensis ssp. calycina* | hooded arrowhead | OBL |
| **Amaranthaceae** | *Amaranthus blitoides* | mat amaranth | FACW |
| **Anacardiaceae** | *Malosma laurina* | laurel sumac | |
| **Anacardiaceae** | *Rhus ovata* | sugar bush | |
| **Apiaceae** | *Bowlesia incana* | hoary bowlesia | FACW |
| **Apiaceae** | *Hydrocotyle verticillata* | whorled marsh pennywort | OBL |
| **Apiaceae** | *Oenanthe sarmentosa* | water parsley | OBL |
| **Asclepiadaceae** | *Asclepias fascicularis* | narrow leaf milkweed | FAC |
| **Asteraceae** | *Amblyopappus pusillus* | dwarf coastweed | FACW |
| **Asteraceae** | *Ambrosia acanthicarpa* | annual bursage | |
| **Asteraceae** | *Ambrosia chamissonis* | Silver Beachweed | |
| **Asteraceae** | *Ambrosia chamissonis var. bipinnatisecta* | Silver Beachweed | |
| **Asteraceae** | *Ambrosia psilostachya* | western ragweed | FAC |
| **Asteraceae** | *Ambrosia psilostachya var. californica* | western ragweed | FAC |
| **Asteraceae** | *Artemisia californica* | California sagebrush | |
| **Asteraceae** | *Artemisia douglasiana* | mugwort | FACW |
| **Asteraceae** | *Artemisia dracunculus* | herbaceous sagewort | |
| **Asteraceae** | *Aster subulatus var. ligulatus* | annual water-aster | |
| **Asteraceae** | *Baccharis douglasii* | saltmarsh baccharis | OBL |
| **Asteraceae** | *Baccharis pilularis* | coyote brush | |
| **Asteraceae** | *Baccharis salicifolia* | mulefat | FACW |
| **Asteraceae** | *Bidens laevis* | bur marigold | OBL |
| **Asteraceae** | *Centromadia parryi subsp. australis* | Parry's tarweed | FAC |
| **Asteraceae** | *Chaenactis glabriuscula* | yellow pincushion | |
| **Asteraceae** | *Chaenactis glabriuscula var. glabriuscula* | yellow pincushion | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Asteraceae** | *Chaenactis glabriuscula var. lanosa* | yellow pincushion | |
| **Asteraceae** | *Chaenactis glabriuscula var. orcuttiana* | yellow pincushion | |
| **Asteraceae** | *Cirsium occidentale var. occidentale* | California thistle | |
| **Asteraceae** | *Conyza canadensis* | Canada horseweed | FAC |
| **Asteraceae** | *Corethrogyne filaginifolia* | common sandaster | |
| **Asteraceae** | *Deinandra fasciculata* | common tarweed | |
| **Asteraceae** | *Ericameria ericoides* | California goldenbush | |
| **Asteraceae** | *Euthamia occidentalis* | western goldenrod | OBL |
| **Asteraceae** | *Filago californica* | California Cottonrose | |
| **Asteraceae** | *Gnaphalium bicolor* | bicolored everlasting | |
| **Asteraceae** | *Gnaphalium californicum* | California cudweed | |
| **Asteraceae** | *Gnaphalium californicum* | California everlasting | |
| **Asteraceae** | *Gnaphalium ramosissimum* | pink everlasting | |
| **Asteraceae** | *Gnaphalium stramineum* | Everlasting Cudweed | FAC |
| **Asteraceae** | *Grindelia camporum* | Great Valley gumweed | |
| **Asteraceae** | *Helianthus annuus subsp. lenticularis* | common sunflower | FAC |
| **Asteraceae** | *Hemizonia australis* | Asteraceae | |
| **Asteraceae** | *Hemizonia fasciculata* | common tarweed | |
| **Asteraceae** | *Heterotheca grandiflora* | telegraphweed | |
| **Asteraceae** | *Jaumea carnosa* | marsh jaumea | OBL |
| **Asteraceae** | *Laennecia coulteri* | Coulter's horseweed | FAC |
| **Asteraceae** | *Lasthenia californica* | California goldfields | FACW |
| **Asteraceae** | *Lasthenia coronaria* | royal goldfields | |
| **Asteraceae** | *Lasthenia glabrata subsp. coulteri* | yellowray goldfields | FACW |
| **Asteraceae** | *Lasthenia gracilis* | needle goldfields | |
| **Asteraceae** | *Layia platyglossa* | White tidy-tips | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Asteraceae** | *Lessingia filaginifolia* | common sandaster | |
| **Asteraceae** | *Logfia filaginoides* | California Cottonrose | |
| **Asteraceae** | *Malacothrix saxatilis var. tenuifolia* | cliff aster | |
| **Asteraceae** | *Pluchea odorata* | salt marsh fleabane | |
| **Asteraceae** | *Pseudognaphalium biolettii* | twocolor cudweed | |
| **Asteraceae** | *Pseudognaphalium canescens ssp. beneolens* | Wright's cudweed | |
| **Asteraceae** | *Pseudognaphalium microcephalum* | | |
| **Asteraceae** | *Pseudognaphalium microcephalum* | white headed cudweed | |
| **Asteraceae** | *Senecio californicus* | California Butterweed | |
| **Asteraceae** | *Stephanomeria diegensis* | San Diego milk aster | |
| **Asteraceae** | *Stephanomeria exigua subsp. coronaria* | milk aster | |
| **Asteraceae** | *Stephanomeria virgata* | Tall stephanomeria | |
| **Asteraceae** | *Symphyotrichum subulatum* | eastern annual saltmarsh aster | FACW |
| **Asteraceae** | *Xanthium spinosum* | spiny cocklebur | FAC |
| **Asteraceae** | *Xanthium strumarium* | rough cockleburr | FAC |
| **Boraginaceae** | *Amsinckia eastwoodiae* | Eastwood's fiddleneck | |
| **Boraginaceae** | *Amsinckia intermedia* | Eastwood's fiddleneck | |
| **Boraginaceae** | *Amsinckia lycopsoides* | Eastwood's fiddleneck | |
| **Boraginaceae** | *Amsinckia spectabilis* | seaside fiddleneck | FACU |
| **Boraginaceae** | *Cryptantha clevelandii* | Cleveland's cryptantha | |
| **Boraginaceae** | *Cryptantha clevelandii var. florosa* | Cleveland's cryptantha | |
| **Boraginaceae** | *Cryptantha intermedia* | Clearwater cryptantha | |
| **Boraginaceae** | *Cryptantha leiocarpa* | coast cryptantha | |
| **Boraginaceae** | *Cryptantha microstachys* | Tejon cryptantha | |
| **Boraginaceae** | *Heliotropium curassavicum* | seaside heliotrope | OBL |
| **Boraginaceae** | *Heliotropium curassavicum var. oculatum* | seaside heliotrope | OBL |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Brassicaceae** | *Descurainia pinnata subsp. menziesii* | western tansymustard | |
| **Brassicaceae** | *Dithyrea californica* | California shieldpod | |
| **Brassicaceae** | *Dithyrea maritima* | beach shieldpod | RARE |
| **Brassicaceae** | *Erysimum insulare subsp. suffrutescens* | suffrutescent wallflower | |
| **Brassicaceae** | *Erysimum suffrutescens* | suffrutescent wallflower | |
| **Brassicaceae** | *Guillenia lasiophylla* | California mustard | |
| **Brassicaceae** | *Lepidium lasiocarpum* | shaggyfruit pepperweed | |
| **Brassicaceae** | *Lepidium nitidum* | shining pepperweed | |
| **Brassicaceae** | *Lepidium virginicum* | wild pepper grass | FACW |
| **Brassicaceae** | *Lepidium virginicum var. pubescens* | hairy pepperweed | FACW |
| **Brassicaceae** | *Rorippa curvisiliqua* | curvepod yellowcress | OBL |
| **Brassicaceae** | *Tropidocarpum gracile* | slender tropidocarpum | |
| **Cactaceae** | *Opuntia oricola* | chaparral pricklypear | |
| **Capparaceae** | *Isomeris arborea* | Coastal bladderpod | |
| **Caryophyllaceae** | *Cardionema ramosissimum* | Sand mat | |
| **Caryophyllaceae** | *Minuartia douglasii* | Douglas' stitchwort | |
| **Caryophyllaceae** | *Polycarpon depressum* | California manyseed | |
| **Caryophyllaceae** | *Spergularia macrotheca* | sticky sandspurry | FAC |
| **Caryophyllaceae** | *Spergularia marina* | salt marsh sand spurry | OBL |
| **Chenopodiaceae** | *Atriplex argentea* | silverscale saltbush | FAC |
| **Chenopodiaceae** | *Atriplex argentea var. mohavensis* | mohave saltbush | FAC |
| **Chenopodiaceae** | *A. argentea var. mohavensis [=Atriplex expansa]* | mohave saltbush | FAC |
| **Chenopodiaceae** | *Atriplex breweri* | quailbush | FAC |
| **Chenopodiaceae** | *Atriplex californica* | California saltbush | FAC |
| **Chenopodiaceae** | *Atriplex lentiformis* | big saltbush | FAC |
| **Chenopodiaceae** | *Atriplex lentiformis subsp. breweri* | quailbush | FAC |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Chenopodiaceae** | *Atriplex lentiformis subsp. lentiformis* | big saltbush | FAC |
| **Chenopodiaceae** | *Atriplex lentiformis var. breweri* | quailbush | FAC |
| **Chenopodiaceae** | *Atriplex leucophylla* | beach saltbush | FAC |
| **Chenopodiaceae** | *Atriplex patula subsp. hastata* | fathen saltweed | FACW |
| **Chenopodiaceae** | *Atriplex triangularis* | spear leaved saltbrush | |
| **Chenopodiaceae** | *Atriplex truncata* | wedgescale | FAC |
| **Chenopodiaceae** | *Salicornia europaea* | slender pickleweed | OBL |
| **Chenopodiaceae** | *Salicornia subterminalis* | Parish's pickleweed | OBL |
| **Chenopodiaceae** | *Salicornia virginica* | pickleweed | OBL |
| **Chenopodiaceae** | *Suaeda calceoliformis* | Pursh seepweed | FACW |
| **Chenopodiaceae** | *Suaeda taxifolia* | woolly seablite | FACW |
| **Chenopodiaeceae** | *Chenopodium berlandieri var. sinuatum* | Berlandier's goosefoot | |
| **Convolvulaceae** | *Calystegia macrostegia subsp. intermedia* | south coast morning-glory | |
| **Convolvulaceae** | *Calystegia soldanella* | beach morning glory | |
| **Convolvulaceae** | *Cressa truxillensis* | spreading alkaliweed | FACW |
| **Crassulaceae** | *Crassula connata* | sand pygmyweed | FAC |
| **Crassulaceae** | *Crassula connata var. erectoides* | sand pygmyweed | FAC |
| **Crassulaceae** | *Dudleya lanceolata* | lanceleaf liveforever | |
| **Cucurbitaceae** | *Cucurbita foetidissima* | calabazilla | |
| **Cucurbitaceae** | *Marah macrocarpus* | southern wild-cucumber | |
| **Cuscutaceae** | *Cuscuta californica* | chaparral dodder | |
| **Cuscutaceae** | *Cuscuta campestris* | field dodder | |
| **Cuscutaceae** | *Cuscuta salina* | saltmarsh dodder | |
| **Cyperaceae** | *Carex praegracilis* | clustered field sedge | FACW |
| **Cyperaceae** | *Cyperus eragrostis* | tall flatsedge | FACW |
| **Cyperaceae** | *Cyperus esculentus* | Yellow nutgrass | FACW |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Cyperaceae** | *Eleocharis macrostachya* | common spikerush | OBL |
| **Cyperaceae** | *Eleocharis montevidensis* | sand spikerush | FACW |
| **Cyperaceae** | *Eleocharis montevidensis var. montevidensis* | sand spikerush | FACW |
| **Cyperaceae** | *Isolepis cernua* | annual tule | OBL |
| **Cyperaceae** | *Schoenoplectus americanus* | chairmaker's bulrush | OBL |
| **Cyperaceae** | *Scirpus [=Schoenoplectus] californicus* | California tule | OBL |
| **Cyperaceae** | *Scirpus californicus* | California tule | OBL |
| **Cyperaceae** | *Scirpus maritimus* | prairie bulrush | OBL |
| **Equisetaceae** | *Equisetum hyemale subsp. affine* | common scouring rush | FACW |
| **Equisetaceae** | *Equisetum telmateia subsp. braunii* | giant horsetail | OBL |
| **Euphorbiaceae** | *Chamaesyce albomarginata* | rattlesnake weed | |
| **Euphorbiaceae** | *Chamaesyce polycarpa var. polycarpa* | small seeded spurge | |
| **Euphorbiaceae** | *Chamaesyce serpens* | creeping spurge | FAC |
| **Euphorbiaceae** | *Croton californicus* | California croton | |
| **Euphorbiaceae** | *Croton californicus var. californicus* | California croton | |
| **Euphorbiaceae** | *Croton californicus var. tenuis* | California croton | |
| **Euphorbiaceae** | *Croton setigerus* | dove weed | |
| **Fabaceae** | *Astragalus didymocarpus var. didymocarpus* | dwarf white milk vetch | |
| **Fabaceae** | *Astragalus pycnostachyus var. lanosissimus* | marsh milk-vetch | OBL |
| **Fabaceae** | *Astragalus trichopodus var. lonchus* | Santa Barbara milk-vetch | |
| **Fabaceae** | *Hoffmannseggia glauca* | Indian rushpea | FACU |
| **Fabaceae** | *Lotus heermannii* | Heermann's lotus | |
| **Fabaceae** | *Lotus scoparius* | deerweed | |
| **Fabaceae** | *Lotus scoparius var. scoparius* | deerweed | |
| **Fabaceae** | *Lotus strigosus* | Hairy Lotus | |
| **Fabaceae** | *Lotus strigosus var. strigosus* | Hairy Lotus | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Fabaceae** | *Lotus unifoliolatus* | American bird's foot trefoil | |
| **Fabaceae** | *Lupinus bicolor* | miniature lupine | |
| **Fabaceae** | *Lupinus bicolor subsp. microphyllus* | miniature lupine | |
| **Fabaceae** | *Lupinus chamissonis* | dune bush lupine | |
| **Fabaceae** | *Lupinus excubitus* | grape lupine | |
| **Fabaceae** | *Lupinus excubitus var. hallii* | Hall's bush lupine | |
| **Fabaceae** | *Lupinus longifolius* | long leaf bush lupine | |
| **Fabaceae** | *Lupinus succulentus* | succulent lupine | |
| **Fabaceae** | *Lupinus truncatus* | truncated lupine | |
| **Fabaceae** | *Trifolium willdenovii* | tomcat clover | |
| **Frankeniaceae** | *Frankenia salina* | alkali seaheath | FACW |
| **Frankeniaceae** | *Frankenia salina* | alkali seaheath | FACW |
| **Frankeniaceae** | *Fraxinus latifolia* | alkali seaheath | FACW |
| **Grossulariaceae** | *Ribes malvaceum var. viridifolium* | chaparral currant | |
| **Hydrophyllaceae** | *Nemophila menziesii* | baby blue eyes | |
| **Hydrophyllaceae** | *Phacelia distans* | common phacelia | |
| **Hydrophyllaceae** | *Phacelia douglasii* | Douglas' phacelia | |
| **Hydrophyllaceae** | *Phacelia ramosissima* | south coast branching phacelia | |
| **Hydrophyllaceae** | *Phacelia ramosissima var. austrolitoralis* | south coast branching phacelia | |
| **Hydrophyllaceae** | *Phacelia stellaris* | Brand's phacelia | |
| **Hydrophyllaceae** | *Phacelia tanacetifolia* | tansy leafed phacelia | |
| **Juncaceae** | *Juncus bufonius* | toad rush | FACW |
| **Juncaceae** | *Juncus mexicanus* | mexican rush | FACW |
| **Juncaceae** | *Juncus textilis* | basket rush | OBL |
| **Lamiaceae** | *Lycopus americanus* | American water horehound | OBL |
| **Lamiaceae** | *Salvia carduacea* | thistle sage | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Lamiaceae** | *Salvia columbariae* | chia sage | |
| **Lamiaceae** | *Stachys ajugoides* | bugle hedgenettle | OBL |
| **Lamiaceae** | *Stachys ajugoides var. rigida* | rigid hedge nettle | OBL |
| **Lamiaceae** | *Stachys albens* | whitestem hedgenettle | OBL |
| **Lemnaceae** | *Lemna minuscula* | least duckweed | OBL |
| **Lemnaceae** | *Lemna valdiviana* | valdivia duckweed | OBL |
| **Lennoaceae** | *Pholisma arenarium* | Desert pholisma | |
| **Loasaceae** | *Mentzelia affinis* | yellow blazing star | |
| **Lythraceae** | *Lythrum californicum* | California loostrife | OBL |
| **Malvaceae** | *Malacothamnus fasciculatus* | chaparral mallow | |
| **Malvaceae** | *Malvella leprosa* | alkali mallow | FAC |
| **Malvaceae** | *Malvella leprosa var. hederacea* | alkali mallow | FAC |
| **Nyctaginaceae** | *Abronia maritima* | red sand verbena | |
| **Nyctaginaceae** | *Abronia umbellata* | purple sand verbena | |
| **Nyctaginaceae** | *Abronia umbellata subsp. umbellata* | purple sand verbena | |
| **Nyctaginaceae** | *Abronia villosa* | desert sand verbena | |
| **Nyctaginaceae** | *Mirabilis laevis var. crassifolia* | California four o'clock | |
| **Oleaceae** | *Fraxinus velutina var. coriacea* | velvet ash | FACW |
| **Onagraceae** | *Camissonia bistorta* | California sun cup | |
| **Onagraceae** | *Camissonia cheiranthifolia subsp. suffruticosa* | beach evening-primrose | |
| **Onagraceae** | *Camissonia lewisii* | Lewis' evening primrose | |
| **Onagraceae** | *Camissonia micrantha* | miniature suncup | |
| **Onagraceae** | *Epilobium ciliatum subsp. ciliatum* | fringed willowherb | FACW |
| **Onagraceae** | *Epilobium pygmaeum* | smooth boisduvalia | OBL |
| **Onagraceae** | *Ludwigia peploides subsp. peploides* | floating primrose willow | OBL |
| **Onagraceae** | *Oenothera elata subsp. hirsutissima* | hairy evening primrose | FACW |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Papaveraceae** | *Eschscholzia californica* | California poppy | |
| **Papaveraceae** | *Platystemon californicus* | cream cups | |
| **Papaveraceae** | *Stylomecon heterophylla* | wind poppy | |
| **Plantaginaceae** | *Plantago erecta* | California plantain | |
| **Poaceae** | *Agrostis viridis* | green bentgrass | |
| **Poaceae** | *Distichlis spicata* | saltgrass | FACW |
| **Poaceae** | *Elymus condensatus* | giant wild rye | FACU |
| **Poaceae** | *Elymus glaucus* | blue wildrye | FACU |
| **Poaceae** | *Elymus triticoides* | alkali rye | FAC |
| **Poaceae** | *Hordeum brachyantherum* | meadow barley | FACW |
| **Poaceae** | *Hordeum intercedens* | vernal barley | FAC |
| **Poaceae** | *Koeleria macrantha* | prairie Junegrass | |
| **Poaceae** | *Leptochloa uninervia* | Mexican sprangletop | FACW |
| **Poaceae** | *Melica imperfecta* | smallflower melicgrass | |
| **Poaceae** | *Nassella pulchra* | purple needlegrass | |
| **Poaceae** | *Phalaris minor* | littleseed canarygrass | |
| **Poaceae** | *Setaria parviflora* | marsh bristlegrass | |
| **Polemoniaceae** | *Gilia clivorum* | purplespot gilia | |
| **Polemoniaceae** | *Linanthus parviflorus* | common linanthus | |
| **Polemoniaceae** | *Navarretia prostrata* | prostrate pincushionplant | OBL |
| **Polygonaceae** | *Eriogonum fasciculatum* | California buckwheat | |
| **Polygonaceae** | *Eriogonum gracile* | slender buckwheat | |
| **Polygonaceae** | *Eriogonum gracile var. gracile* | slender buckwheat | |
| **Polygonaceae** | *Eriogonum parvifolium* | seacliff buckwheat | |
| **Polygonaceae** | *Eriogonum parvifolium var. parvifolium* | seacliff buckwheat | |
| **Polygonaceae** | *Lastarriaea coriacea* | leather spineflower | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Polygonaceae** | *Mucronea californica* | California spineflower | |
| **Polygonaceae** | *Mucronea californica var. suksdorfii* | California spineflower | |
| **Polygonaceae** | *Polygonum hydropiperoides* | swamp smartweed | OBL |
| **Polygonaceae** | *Polygonum lapathifolium* | curlytop knotweed | OBL |
| **Polygonaceae** | *Pterostegia drymarioides* | woodland pterostegia | |
| **Polygonaceae** | *Rumex maritimus* | golden dock | FACW |
| **Polygonaceae** | *Rumex salicifolius* | willow dock | OBL |
| **Portulacaceae** | *Calandrinia ciliata* | red maids | FACU |
| **Portulacaceae** | *Calyptridium monandrum* | common pussypaws | |
| **Potamogetonaceae** | *Ruppia cirrhosa* | spiral ditchgrass | OBL |
| **Potamogetonaceae** | *Ruppia maritima* | widgeongrass | OBL |
| **Ranunculaceae** | *Clematis ligusticifolia* | creek clematis | FAC |
| **Ranunculaceae** | *Delphinium parryi subsp. maritimum* | seaside larkspur | |
| **Ranunculaceae** | *Delphinium parryi subsp. parryi* | San Bernardino larkspur | |
| **Rosaceae** | *Potentilla anserina ssp. pacifica* | Pacific potentilla | OBL |
| **Rosaceae** | *Potentilla anserina subsp. pacifica* | silver-weed cinquefoil | OBL |
| **Rosaceae** | *Potentilla anserina var. grandis* | silver-weed cinquefoil | OBL |
| **Rosaceae** | *Potentilla multijuga* | ballona cinquefoil | OBL |
| **Rubiaceae** | *Galium angustifolium subsp. angustifolium* | narrowleaf bedstraw | |
| **Salicaceae** | *Populus fremontii* | Fremont cottonwood | FACW |
| **Salicaceae** | *Salix exigua* | sandbar willow | OBL |
| **Salicaceae** | *Salix laevigata* | red willow | |
| **Salicaceae** | *Salix lasiolepis* | arroyo willow | FACW |
| **Saururaceae** | *Anemopsis californica* | yerba mansa | OBL |
| **Scrophulariaceae** | *Antirrhinum coulterianum* | Coulter's snapdragon | |
| **Scrophulariaceae** | *Antirrhinum nuttallianum subsp. nuttallianum* | Nuttall's snapdragon | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Scrophulariaceae** | *Castilleja exserta* | purple owl's clover | |
| **Scrophulariaceae** | *Collinsia heterophylla* | purple Chinese houses | |
| **Scrophulariaceae** | *Cordylanthus maritimus subsp. maritimus* | salt marsh bird's beak | OBL |
| **Scrophulariaceae** | *Mimulus guttatus* | seep monkeyflower | OBL |
| **Solanaceae** | *Datura wrightii* | Jimson weed | |
| **Solanaceae** | *Nicotiana clevelandii* | Cleveland's tobacco | |
| **Solanaceae** | *Solanum americanum* | common nightshade | FAC |
| **Solanaceae** | *Solanum douglasii* | Douglas' nightshade | FAC |
| **Typhaceae** | *Sparganium erectum subsp. stoloniferum* | simplestem bur-reed | OBL |
| **Typhaceae** | *Typha domingensis* | narrowleaf cattail | OBL |
| **Typhaceae** | *Typha latifolia* | broadleaf cattail | OBL |
| **Urticaceae** | *Urtica dioica subsp. holosericea* | giant creek nettle | FACW |
| **Urticaceae** | *Urtica urens* | dwarf nettle | |
| **Verbenaceae** | *Phyla lanceolata* | lanceleaf fogfruit | |
| **Verbenaceae** | *Phyla lanceolata* | lanceleaf fogfruit | FACW |
| **Verbenaceae** | *Verbena lasiostachys var. lasiostachys* | Common verbena | FAC |
| **Zosteraceae** | *Phyllospadix torreyi* | Torrey's surfgrass | OBL |

## APPENDIX 4.
## FLORA OF THE SANTA MONICA MOUNTAIN REGION AS DOCUMENTED IN HERBARIUM RECORDS

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Amaranthaceae** | *Amaranthus blitoides* | mat amaranth | FACW |
| **Amaranthaceae** | *Amaranthus powellii* | Powell's amaranth | |
| **Anacardiaceae** | *Malosma laurina* | laurel sumac | |
| **Anacardiaceae** | *Rhus integrifolia* | lemonade berry | |
| **Anacardiaceae** | *Rhus ovata* | sugar bush | |
| **Anacardiaceae** | *Rhus trilobata* | skunkbush sumac | NI |
| **Anacardiaceae** | *Rhus trilobata var. pilosissima* | skunkbush sumac | NI |
| **Apiaceae** | *Apiastrum angustifolium* | wild celery | |
| **Apiaceae** | *Berula erecta* | cutleaf water-parsnip | OBL |
| **Apiaceae** | *Bowlesia incana* | hoary bowlesia | FACW |
| **Apiaceae** | *Daucus pusillus* | Wild carrot | |
| **Apiaceae** | *Lomatium lucidum* | shiny biscuitroot | |
| **Apiaceae** | *Sanicula arguta* | sharp toothed snakeroot | |
| **Apiaceae** | *Sanicula bipinnata* | poison sanicle | |
| **Apiaceae** | *Sanicula crassicaulis* | Pacific blacksnakeroot | |
| **Apiaceae** | *Tauschia arguta* | southern umbrellawort | |
| **Asteraceae** | *Achillea millefolium* | common yarrow | FACU |
| **Asteraceae** | *Acourtia microcephala* | sacapellote | |
| **Asteraceae** | *Ambrosia acanthicarpa* | annual bursage | |
| **Asteraceae** | *Ambrosia chamissonis* | Silver Beachweed | |
| **Asteraceae** | *Ambrosia confertiflora* | weak leaved burweed | |
| **Asteraceae** | *Ambrosia psilostachya* | western ragweed | FAC |
| **Asteraceae** | *Ambrosia psilostachya var. californica* | western ragweed | FAC |
| **Asteraceae** | *Artemisia californica* | California sagebrush | |
| **Asteraceae** | *Artemisia douglasiana* | mugwort | FACW |
| **Asteraceae** | *Artemisia dracunculus* | herbaceous sagewort | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Asteraceae** | *Baccharis douglasii* | saltmarsh baccharis | OBL |
| **Asteraceae** | *Baccharis pilularis* | coyote brush | |
| **Asteraceae** | *Baccharis salicifolia* | mulefat | FACW- |
| **Asteraceae** | *Brickellia californica* | California brickellbush | FACU |
| **Asteraceae** | *Brickellia nevinii* | Nevin's brickellia | |
| **Asteraceae** | *Centromadia parryi subsp. australis* | Parry's tarweed | FAC |
| **Asteraceae** | *Chaenactis artemisiifolia* | artemisia leaved chaenactis | |
| **Asteraceae** | *Chaenactis glabriuscula var. glabriuscula* | yellow pincushion | |
| **Asteraceae** | *Cirsium occidentale* | California thistle | |
| **Asteraceae** | *Cirsium occidentale var. californicum* | California thistle | |
| **Asteraceae** | *Cirsium occidentale var. occidentale* | California thistle | |
| **Asteraceae** | *Conyza canadensis* | Canada horseweed | FAC |
| **Asteraceae** | *Corethrogyne filaginifolia* | common sandaster | |
| **Asteraceae** | *Corethrogyne filaginifolia var. virgata* | common sandaster | |
| **Asteraceae** | *Deinandra fasciculata* | common tarweed | |
| **Asteraceae** | *Dicoria canescens* | desert dicoria | |
| **Asteraceae** | *Encelia californica* | California sunflower | |
| **Asteraceae** | *Ericameria ericoides* | California goldenbush | |
| **Asteraceae** | *Ericameria linearifolia* | narrowleaf goldenbush | |
| **Asteraceae** | *Ericameria palmeri var. pachylepis* | broad scaled Palmer's goldenbush | |
| **Asteraceae** | *Ericameria parishii* | Parish's goldenbush | |
| **Asteraceae** | *Ericameria pinifolia* | pinebush | |
| **Asteraceae** | *Erigeron foliosus* | leafy fleabane | |
| **Asteraceae** | *Erigeron foliosus var. foliosus* | leafy fleabane | |
| **Asteraceae** | *Eriophyllum confertiflorum* | golden-yarrow | |
| **Asteraceae** | *Eriophyllum confertiflorum var. confertiflorum* | golden-yarrow | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Asteraceae** | *Filago californica* | California Cottonrose | |
| **Asteraceae** | *Gnaphalium bicolor* | bicolored everlasting | |
| **Asteraceae** | *Gnaphalium californicum* | California cudweed | |
| **Asteraceae** | *Gnaphalium californicum* | California everlasting | |
| **Asteraceae** | *Gnaphalium canescens subsp. microcephalum* | white everlasting | |
| **Asteraceae** | *Gnaphalium ramosissimum* | pink everlasting | |
| **Asteraceae** | *Grindelia camporum* | Great Valley gumweed | |
| **Asteraceae** | *Grindelia hirsutula* | hairy gumweed | FACW |
| **Asteraceae** | *Gutierrezia californica* | California matchweed | |
| **Asteraceae** | *Gutierrezia sarothrae* | Matchweed | |
| **Asteraceae** | *Hazardia squarrosa var. grindelioides* | saw toothed goldenbush | |
| **Asteraceae** | *Hazardia squarrosa var. squarrosa* | saw toothed goldenbush | |
| **Asteraceae** | *Hemizonia fasciculata* | common tarweed | |
| **Asteraceae** | *Heterotheca grandiflora* | telegraphweed | |
| **Asteraceae** | *Heterotheca sessiliflora ssp. fastigiata* | erect goldenaster | |
| **Asteraceae** | *Isocoma menziesii var. vernonioides* | white-flowered goldenbush | FAC |
| **Asteraceae** | *Iva hayesiana* | San Diego marsh elder | FACW |
| **Asteraceae** | *Laennecia coulteri* | Coulter's horseweed | FAC |
| **Asteraceae** | *Lasthenia californica* | California goldfields | FACW |
| **Asteraceae** | *Lasthenia gracilis* | needle goldfields | |
| **Asteraceae** | *Layia platyglossa* | White tidy-tips | |
| **Asteraceae** | *Layia platyglossa subsp. campestris* | White tidy-tips | |
| **Asteraceae** | *Lepidospartum squamatum* | scalebroom | |
| **Asteraceae** | *Lepidospartum squamatum var. squamatum* | scalebroom | |
| **Asteraceae** | *Lessingia filaginifolia* | common sandaster | |
| **Asteraceae** | *Madia gracilis* | slender tarweed | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Asteraceae** | *Madia sativa* | coast tarweed | |
| **Asteraceae** | *Malacothrix saxatilis var. tenuifolia* | cliff aster | |
| **Asteraceae** | *Monolopia lanceolata* | common monolopia | |
| **Asteraceae** | *Pluchea sericea* | arroweed | FACW |
| **Asteraceae** | *Pseudognaphalium biolettii* | twocolor cudweed | |
| **Asteraceae** | *Pseudognaphalium microcephalum* | | |
| **Asteraceae** | *Pseudognaphalium microcephalum* | white headed cudweed | |
| **Asteraceae** | *Pseudognaphalium ramosissimum* | pink cudweed | |
| **Asteraceae** | *Pseudognaphalium stramineum* | Small flowered cudweed | FAC |
| **Asteraceae** | *Psilocarphus tenellus* | round woolly-marbles | FAC |
| **Asteraceae** | *Rafinesquia californica* | California chicory | |
| **Asteraceae** | *Senecio californicus* | California Butterweed | |
| **Asteraceae** | *Senecio flaccidus* | Douglas' shrubby ragwort | |
| **Asteraceae** | *Senecio flaccidus var. douglasii* | Douglas' shrubby ragwort | |
| **Asteraceae** | *Solidago californica* | California goldenrod | |
| **Asteraceae** | *Solidago velutina subsp. californica* | | |
| **Asteraceae** | *Stebbinsoseris heterocarpa* | grassland stebbinsoseris | |
| **Asteraceae** | *Stephanomeria cichoriacea* | chicory leaved stephanomeria | |
| **Asteraceae** | *Stephanomeria diegensis* | San Diego milk aster | |
| **Asteraceae** | *Stephanomeria exigua subsp. coronaria* | milk aster | |
| **Asteraceae** | *Stephanomeria virgata* | Tall stephanomeria | |
| **Asteraceae** | *Stephanomeria virgata subsp. virgata* | Tall stephanomeria | |
| **Asteraceae** | *Symphyotrichum defoliatum [=Aster bernardinus]* | San Bernardino aster | RARE |
| **Asteraceae** | *Symphyotrichum greatae [=Aster greatae0* | Greata's aster | RARE |
| **Asteraceae** | *Venegasia carpesioides* | canyon sunflower | |
| **Asteraceae** | *Xanthium spinosum* | spiny cocklebur | FAC |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Asteraceae** | *Xanthium strumarium* | rough cockleburr | FAC |
| **Azollaceae** | *Azolla filiculoides* | mosquito fern | OBL |
| **Berberidaceae** | *Berberis nevinii* | Nevin's barberry | |
| **Boraginaceae** | *Amsinckia intermedia* | Eastwood's fiddleneck | |
| **Boraginaceae** | *Amsinckia punctata* | | |
| **Boraginaceae** | *Cryptantha intermedia* | Clearwater cryptantha | |
| **Boraginaceae** | *Cryptantha micromeres* | minute flowered cryptantha | |
| **Boraginaceae** | *Cryptantha microstachys* | Tejon cryptantha | |
| **Boraginaceae** | *Cryptantha muricata* | prickly cryptantha | |
| **Boraginaceae** | *Cryptantha muricata var. jonesii* | prickly cryptantha | |
| **Boraginaceae** | *Pectocarya penicillata* | sagebrush combseed | |
| **Boraginaceae** | *Pedicularis densiflora* | Indian warrior | |
| **Boraginaceae** | *Plagiobothrys collinus* | Cooper's popcornflower | |
| **Brassicaceae** | *Arabis glabra* | smooth rock cress | |
| **Brassicaceae** | *Barbarea orthoceras* | American Wintercress | FACW |
| **Brassicaceae** | *Cardamine californica* | California toothwort | UPL* |
| **Brassicaceae** | *Caulanthus heterophyllus var. pseudosimulans* | San Diego wild cabbage | |
| **Brassicaceae** | *Descurainia pinnata subsp. menziesii* | western tansymustard | |
| **Brassicaceae** | *Erysimum capitatum subsp. capitatum* | western wallflower | |
| **Brassicaceae** | *Guillenia lasiophylla* | California mustard | |
| **Brassicaceae** | *Lepidium virginicum* | wild pepper grass | FACW |
| **Brassicaceae** | *Thysanocarpus curvipes* | common fringe-pod | |
| **Brassicaceae** | *Thysanocarpus laciniatus* | common lace pod | |
| **Brassicaceae** | *Tropidocarpum gracile* | slender tropidocarpum | |
| **Cactaceae** | *Opuntia littoralis* | coast prickly pear | |
| **Cactaceae** | *Opuntia vaseyi* | Vasey's prickly pear | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Campanulaceae** | *Githopsis diffusa subsp. candida* | San Gabriel bluecup | |
| **Campanulaceae** | *Triodanis biflora* | Venus looking glass | |
| **Capparaceae** | *Isomeris arborea* | Coastal bladderpod | |
| **Caprifoliaceae** | *Lonicera interrupta* | chaparral honeysuckle | |
| **Caprifoliaceae** | *Lonicera subspicata var. denudata* | southern honeysuckle | |
| **Caprifoliaceae** | *Sambucus nigra ssp. caerulea* | blue elderberry | FAC |
| **Caprifoliaceae** | *Symphoricarpos mollis* | creeping snowberry | |
| **Caryophyllaceae** | *Polycarpon depressum* | California manyseed | |
| **Caryophyllaceae** | *Silene antirrhina* | sleepy silene | |
| **Caryophyllaceae** | *Silene laciniata* | Indian pink | |
| **Caryophyllaceae** | *Silene laciniata subsp. major* | Indian pink | |
| **Chenopodiaceae** | *Atriplex serenana* | saltscale | FAC |
| **Chenopodiaceae** | *Chenopodium californicum* | soaproot | |
| **Chenopodiaeceae** | *Chenopodium berlandieri* | Berlandier's goosefoot | |
| **Cistaceae** | *Helianthemum scoparium* | common sun-rose | |
| **Cistaceae** | *Helianthemum scoparium var. scoparium* | common sun-rose | |
| **Cistaceae** | *Helianthemum scoparium var. vulgare* | common sun-rose | |
| **Convolvulaceae** | *Calystegia macrostegia* | south coast morning-glory | |
| **Convolvulaceae** | *Calystegia macrostegia subsp. cyclostegia* | south coast morning-glory | |
| **Convolvulaceae** | *Calystegia macrostegia subsp. intermedia* | south coast morning-glory | |
| **Convolvulaceae** | *Calystegia purpurata* | Pacific false bindweed | |
| **Convolvulaceae** | *Convolvulus simulans* | small flowered morning glory | RARE |
| **Cornaceae** | *Cornus occidentalis* | Creek Dogwood | FACW |
| **Crassulaceae** | *Crassula connata var. erectoides* | sand pygmyweed | FAC |
| **Crassulaceae** | *Dudleya lanceolata* | lanceleaf liveforever | |
| **Crassulaceae** | *Dudleya multicaulis* | manystem liveforever | RARE |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Cucurbitaceae** | *Marah macrocarpus* | southern wild-cucumber | |
| **Cucurbitaceae** | *Marah macrocarpus var. macrocarpus* | southern wild-cucumber | |
| **Cuscutaceae** | *Cuscuta californica* | chaparral dodder | |
| **Cuscutaceae** | *Cuscuta subinclusa* | canyon dodder | |
| **Cyperaceae** | *Carex triquetra* | triangular fruit sedge | |
| **Cyperaceae** | *Scirpus californicus* | California tule | OBL |
| **Dennstaedtiaceae** | *Pteridium aquilinum* | western brackenfern | FACU |
| **Dennstaedtiaceae** | *Pteridium aquilinum var. pubescens* | hairy brackenfern | FACU |
| **Dryopteridaceae** | *Athyrium filix-femina var. californicum* | Western Lady Fern | FAC |
| **Dryopteridaceae** | *Dryopteris arguta* | California wood fern | |
| **Equisetaceae** | *Equisetum hyemale subsp. affine* | common scouring rush | FACW |
| **Equisetaceae** | *Equisetum laevigatum* | smooth horsetail | FACW |
| **Ericaceae** | *Arctostaphylos glandulosa* | Eastwood manzanita | |
| **Ericaceae** | *Arctostaphylos glandulosa subsp. mollis* | Eastwood manzanita | |
| **Euphorbiaceae** | *Chamaesyce albomarginata* | rattlesnake weed | |
| **Euphorbiaceae** | *Chamaesyce melanadenia* | squaw spurge | |
| **Euphorbiaceae** | *Chamaesyce polycarpa* | small seeded spurge | |
| **Euphorbiaceae** | *Chamaesyce polycarpa var. polycarpa* | small seeded spurge | |
| **Euphorbiaceae** | *Chamaesyce serpens* | creeping spurge | FAC |
| **Euphorbiaceae** | *Chamaesyce serpyllifolia* | thyme leafed spurge | |
| **Euphorbiaceae** | *Croton californicus* | California croton | |
| **Euphorbiaceae** | *Croton setigerus* | dove weed | |
| **Euphorbiaceae** | *Euphorbia polycarpa* | small seeded spurge | |
| **Fabaceae** | *Amorpha californica* | California false indigo | |
| **Fabaceae** | *Amorpha californica var. californica* | California false indigo | |
| **Fabaceae** | *Astragalus didymocarpus var. didymocarpus* | dwarf white milk vetch | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Fabaceae** | *Astragalus gambelianus* | Gambel's dwarf milk vetch | |
| **Fabaceae** | *Astragalus trichopodus var. phoxus* | Santa Barbara milk-vetch | |
| **Fabaceae** | *Cercis occidentalis* | western redbud | |
| **Fabaceae** | *Lathyrus vestitus subsp. laetiflorus* | wild sweetpea | |
| **Fabaceae** | *Lathyrus vestitus subsp. laevicarpus* | wild sweetpea | |
| **Fabaceae** | *Lathyrus vestitus subsp. vestitus* | wild sweetpea | |
| **Fabaceae** | *Lathyrus vestitus var. vestitus* | wild sweetpea | |
| **Fabaceae** | *Lotus argophyllus var. argophyllus* | southern California silver lotus | |
| **Fabaceae** | *Lotus purshianus var. purshianus* | Spanish clover | |
| **Fabaceae** | *Lotus salsuginosus* | coastal lotus | |
| **Fabaceae** | *Lotus salsuginosus var. salsuginosus* | coastal lotus | |
| **Fabaceae** | *Lotus scoparius* | deerweed | |
| **Fabaceae** | *Lotus strigosus* | Hairy Lotus | |
| **Fabaceae** | *Lotus strigosus var. strigosus* | Hairy Lotus | |
| **Fabaceae** | *Lotus wrangelianus* | Calf lotus | |
| **Fabaceae** | *Lupinus affinis* | fleshy lupine | |
| **Fabaceae** | *Lupinus bicolor* | miniature lupine | |
| **Fabaceae** | *Lupinus excubitus* | grape lupine | |
| **Fabaceae** | *Lupinus excubitus var. hallii* | Hall's bush lupine | |
| **Fabaceae** | *Lupinus formosus* | summer lupine | |
| **Fabaceae** | *Lupinus formosus var. formosus* | summer lupine | |
| **Fabaceae** | *Lupinus hirsutissimus* | stinging annual lupine | |
| **Fabaceae** | *Lupinus latifolius subsp. parishii* | broadleaf lupine | |
| **Fabaceae** | *Lupinus lepidus var. sellulus* | dwarf tidy lupine | |
| **Fabaceae** | *Lupinus longifolius* | long leaf bush lupine | |
| **Fabaceae** | *Lupinus sparsiflorus* | Coulter's lupine | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Fabaceae** | *Lupinus sparsiflorus subsp. sparsiflorus* | Coulter's lupine | |
| **Fabaceae** | *Lupinus succulentus* | succulent lupine | |
| **Fabaceae** | *Lupinus truncatus* | truncated lupine | |
| **Fabaceae** | *Pickeringia montana* | chaparral pea | |
| **Fabaceae** | *Rupertia physodes* | California tea | |
| **Fabaceae** | *Trifolium albopurpureum* | Indian clover | FACU |
| **Fabaceae** | *Trifolium ciliolatum* | foothill clover | |
| **Fabaceae** | *Trifolium gracilentum* | pinpoint clover | |
| **Fabaceae** | *Vicia americana* | American vetch | FACU |
| **Fabaceae** | *Vicia americana var. americana* | American vetch | FACU |
| **Fagaceae** | *Quercus agrifolia* | coast live oak | |
| **Fagaceae** | *Quercus berberidifolia* | inland scrub oak | |
| **Fagaceae** | *Quercus dumosa* | Nuttall's scrub oak | |
| **Fagaceae** | *Quercus durata var. gabrielensis* | San Gabriel Mtns. leather oak | |
| **Fagaceae** | *Quercus wislizeni var. frutescens* | Chapparal Oak | |
| **Fumariaceae** | *Ehrendorferia ochroleuca* | yellow bleeding heart | |
| **Gentianaceae** | *Centaurium venustum* | Beautiful centaury | |
| **Geraniaceae** | *Geranium carolinianum* | Carolina geranium | |
| **Grossulariaceae** | *Ribes aureum var. gracillimum* | golden currant | FACW |
| **Grossulariaceae** | *Ribes californicum var. hesperium* | California gooseberry | |
| **Grossulariaceae** | *Ribes indecorum* | white-flowering currant | |
| **Grossulariaceae** | *Ribes malvaceum* | chaparral currant | |
| **Grossulariaceae** | *Ribes malvaceum var. viridifolium* | chaparral currant | |
| **Grossulariaceae** | *Ribes speciosum* | fuchsia flowered gooseberry | |
| **Hydrophyllaceae** | *Emmenanthe penduliflora* | whisperingbells | |
| **Hydrophyllaceae** | *Emmenanthe penduliflora var. penduliflora* | whisperingbells | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Hydrophyllaceae** | *Eriodictyon trichocalyx* | hairy yerba santa | |
| **Hydrophyllaceae** | *Eucrypta chrysanthemifolia* | common eucrypta | |
| **Hydrophyllaceae** | *Eucrypta chrysanthemifolia var. chrysanthemifolia* | common eucrypta | |
| **Hydrophyllaceae** | *Nama stenocarpum* | mud fiddleleaf | FACW |
| **Hydrophyllaceae** | *Nemophila menziesii* | baby blue eyes | |
| **Hydrophyllaceae** | *Nemophila menziesii var. integrifolia* | baby blue eyes | |
| **Hydrophyllaceae** | *Phacelia cicutaria* | caterpillar phacelia | |
| **Hydrophyllaceae** | *Phacelia cicutaria var. hispida* | caterpillar phacelia | |
| **Hydrophyllaceae** | *Phacelia cicutaria var. hubbyi* | caterpillar phacelia | |
| **Hydrophyllaceae** | *Phacelia grandiflora* | giant flowerd phacelia | |
| **Hydrophyllaceae** | *Phacelia imbricata subsp. imbricata* | imbricate phacelia | |
| **Hydrophyllaceae** | *Phacelia minor* | California bluebell | |
| **Hydrophyllaceae** | *Phacelia parryi* | Parry's phacelia | |
| **Hydrophyllaceae** | *Phacelia viscida* | sticky phacelia | |
| **Hydrophyllaceae** | *Pholistoma auritum* | blue fiestaflower | |
| **Hydrophyllaceae** | *Turricula parryi* | common turricula | |
| **Iridaceae** | *Sisyrinchium bellum* | blue-eyed grass | FAC |
| **Juglandaceae** | *Juglans californica* | Southern California black walnut | FAC |
| **Juglandaceae** | *Juglans californica var. californica* | Southern California black walnut | FAC |
| **Juncaceae** | *Juncus balticus* | wire rush | FACW |
| **Juncaceae** | *Juncus textilis* | basket rush | OBL |
| **Lamiaceae** | *Salvia apiana* | white sage | |
| **Lamiaceae** | *Salvia columbariae* | chia sage | |
| **Lamiaceae** | *Salvia leucophylla* | purple sage | |
| **Lamiaceae** | *Salvia mellifera* | black sage | |
| **Lamiaceae** | *Salvia spathacea* | hummingbird sage | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Lamiaceae** | *Scutellaria tuberosa* | Danny's skullcap | |
| **Lamiaceae** | *Stachys ajugoides var. rigida* | rigid hedge nettle | |
| **Lamiaceae** | *Stachys ajugoides var. rigida* | rigid hedge nettle | OBL |
| **Lamiaceae** | *Stachys bullata* | California hedgenettle | |
| **Lamiaceae** | *Trichostema lanatum* | woolly bluecurls | |
| **Lamiaceae** | *Trichostema lanceolatum* | vinegarweed | |
| **Lauraceae** | *Umbellularia californica* | California laurel | FAC |
| **Lemnaceae** | *Lemna valdiviana* | valdivia duckweed | OBL |
| **Liliaceae** | *Allium haematochiton* | redskin onion | |
| **Liliaceae** | *Allium peninsulare* | Mexicali onion | |
| **Liliaceae** | *Bloomeria crocea* | common goldenstar | |
| **Liliaceae** | *Bloomeria crocea var. crocea* | common goldenstar | |
| **Liliaceae** | *Brodiaea terrestris subsp. kernensis* | chaparral brodiaea | |
| **Liliaceae** | *Calochortus catalinae* | Catalina mariposa lily | |
| **Liliaceae** | *Calochortus clavatus var. clavatus* | club haired mariposa | |
| **Liliaceae** | *Calochortus plummerae* | Plummer's mariposa lily | |
| **Liliaceae** | *Dichelostemma capitatum* | blue dicks | |
| **Liliaceae** | *Fritillaria biflora* | chocolate lily | |
| **Liliaceae** | *Lilium humboldtii* | Humboldt's lily | |
| **Liliaceae** | *Triteleia ixioides subsp. scabra* | prettyface | FAC |
| **Liliaceae** | *Triteleia laxa* | Ithuriel's spear | |
| **Liliaceae** | *Yucca whipplei subsp. intermedia* | chaparral yucca | |
| **Liliaceae** | *Yucca whipplei var. parishii* | chaparral yucca | |
| **Liliaceae** | *Zigadenus fremontii* | Fremont's Star Lily | |
| **Loasaceae** | *Mentzelia lindleyi* | Lindley's blazing star | |
| **Loasaceae** | *Mentzelia micrantha* | chaparral blazing star | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Lythraceae** | *Lythrum californicum* | California loostrife | OBL |
| **Malvaceae** | *Malacothamnus fasciculatus* | chaparral mallow | |
| **Malvaceae** | *Malacothamnus fasciculatus var. fasciculatus* | chaparral mallow | |
| **Malvaceae** | *Malvella leprosa var. hederacea* | alkali mallow | FAC |
| **Nyctaginaceae** | *Mirabilis laevis var. crassifolia* | California four o'clock | |
| **Nyctaginaceae** | *Mirabilis multiflora var. pubescens* | Colorado four o'clock | |
| **Onagraceae** | *Camissonia bistorta* | California sun cup | |
| **Onagraceae** | *Camissonia californica* | California suncup | |
| **Onagraceae** | *Camissonia hirtella* | Santa Cruz Island suncup | |
| **Onagraceae** | *Camissonia ignota* | Jurupa Hills sun cups | |
| **Onagraceae** | *Camissonia intermedia* | intermediate suncup | |
| **Onagraceae** | *Camissonia micrantha* | miniature suncup | |
| **Onagraceae** | *Camissonia robusta* | robust sun cup | |
| **Onagraceae** | *Clarkia bottae* | Botta's clarkia | |
| **Onagraceae** | *Clarkia cylindrica* | speckled clarkia | |
| **Onagraceae** | *Clarkia dudleyana* | Dudley's clarkia | |
| **Onagraceae** | *Clarkia epilobioides* | Willow Herb Clarkia | |
| **Onagraceae** | *Clarkia purpurea* | purple clarkia | |
| **Onagraceae** | *Clarkia unguiculata* | elegant clarkia | |
| **Onagraceae** | *Epilobium canum subsp. canum* | California fuchsia | |
| **Onagraceae** | *Epilobium ciliatum* | fringed willowherb | FACW |
| **Onagraceae** | *Epilobium paniculatum* | autumn willowherb | |
| **Oxalidaceae** | *Oxalis albicans subsp. californica* | California woodsorrel | |
| **Paeoniaceae** | *Paeonia californica* | California peony | |
| **Papaveraceae** | *Dendromecon rigida subsp. rigida* | bush poppy | |
| **Papaveraceae** | *Eschscholzia californica* | California poppy | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Papaveraceae** | *Meconella denticulata* | smallflower fairypoppy | |
| **Papaveraceae** | *Papaver californicum* | western poppy | |
| **Papaveraceae** | *Platystemon californicus* | cream cups | |
| **Plantaginaceae** | *Plantago erecta* | California plantain | |
| **Platanaceae** | *Platanus racemosa* | western sycamore | FACW |
| **Poaceae** | *Vulpia bromoides* | | |
| **Poaceae** | *Achnatherum coronatum* | giant needlegrass | |
| **Poaceae** | *Agrostis pallens* | Bent grass | |
| **Poaceae** | *Bothriochloa barbinodis* | Beard grass | |
| **Poaceae** | *Bromus arizonicus* | Arizona brome | |
| **Poaceae** | *Bromus carinatus* | California brome | |
| **Poaceae** | *Elymus condensatus* | giant wild rye | FACU |
| **Poaceae** | *Elymus glaucus* | blue wildrye | FACU |
| **Poaceae** | *Hordeum brachyantherum* | meadow barley | FACW |
| **Poaceae** | *Melica imperfecta* | smallflower melicgrass | |
| **Poaceae** | *Muhlenbergia microsperma* | littleseed muhly | |
| **Poaceae** | *Nassella lepida* | small flowered needlegrass | |
| **Poaceae** | *Poa secunda* | one sided blue grass | FACW |
| **Poaceae** | *Setaria parviflora* | marsh bristlegrass | |
| **Poaceae** | *Vulpia octoflora* | sixweeks fescue | |
| **Polemoniaceae** | *Allophyllum glutinosum* | sticky false gilia | |
| **Polemoniaceae** | *Eriastrum sapphirinum* | sapphire woollystar | |
| **Polemoniaceae** | *Eriastrum sapphirinum subsp. dasyanthum* | sapphire woollystar | |
| **Polemoniaceae** | *Gilia angelensis* | chaparral gilia | |
| **Polemoniaceae** | *Gilia cana subsp. cana* | showy gilia | |
| **Polemoniaceae** | *Gilia capitata* | blue field-gilia | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Polemoniaceae** | *Gilia capitata subsp. abrotanifolia* | blue field-gilia | |
| **Polemoniaceae** | *Gilia tricolor* | Tricolor gilia | |
| **Polemoniaceae** | *Leptodactylon californicum* | prickly phlox | |
| **Polemoniaceae** | *Leptodactylon californicum ssp. californicum* | California prickly phlox | |
| **Polemoniaceae** | *Leptosiphon grandiflorus* | large flowered leptosiphon | |
| **Polemoniaceae** | *Leptosiphon liniflorus* | narrowflower flaxflower | |
| **Polemoniaceae** | *Navarretia atractyloides* | hollyleaf pincushionplant | |
| **Polemoniaceae** | *Navarretia hamata subsp. hamata* | hooked pincushionplant | |
| **Polemoniaceae** | *Saltugilia splendens* | | |
| **Polygonaceae** | *Chorizanthe parryi var. fernandina* | Parry's spineflower | RARE |
| **Polygonaceae** | *Chorizanthe staticoides* | Turkish rugging | |
| **Polygonaceae** | *Eriogonum elongatum* | longstem buckwheat | |
| **Polygonaceae** | *Eriogonum elongatum var. elongatum* | longstem buckwheat | |
| **Polygonaceae** | *Eriogonum fasciculatum* | California buckwheat | |
| **Polygonaceae** | *Eriogonum fasciculatum var. fasciculatum* | California buckwheat | |
| **Polygonaceae** | *Eriogonum fasciculatum var. foliolosum* | California buckwheat | |
| **Polygonaceae** | *Eriogonum gracile* | slender buckwheat | |
| **Polygonaceae** | *Pterostegia drymarioides* | woodland pterostegia | |
| **Polygonaceae** | *Rumex salicifolius var. salicifolius* | willow dock | OBL |
| **Polypodiaceae** | *Polypodium californicum* | California polypody | |
| **Portulacaceae** | *Calandrinia breweri* | Brewer's calandrinia | |
| **Portulacaceae** | *Calandrinia ciliata* | red maids | FACU |
| **Portulacaceae** | *Claytonia perfoliata subsp. mexicana* | miner's lettuce | FAC |
| **Portulacaceae** | *Claytonia perfoliata subsp. perfoliata* | miner's lettuce | FAC |
| **Potamogetonaceae** | *Stuckenia pectinata* | sago pondweed | OBL |
| **Primulaceae** | *Dodecatheon clevelandii* | padre's shootingstar | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Primulaceae** | *Dodecatheon clevelandii subsp. clevelandii* | padre's shootingstar | |
| **Pteridaceae** | *Adiantum jordanii* | California maiden-hair | FAC |
| **Pteridaceae** | *Pellaea andromedifolia* | coffee fern | |
| **Pteridaceae** | *Pellaea mucronata* | bird's foot fern | |
| **Pteridaceae** | *Pentagramma triangularis subsp. triangularis* | gold back fern | |
| **Ranunculaceae** | *Clematis ligusticifolia* | creek clematis | FAC |
| **Ranunculaceae** | *Delphinium cardinale* | scarlet larkspur | |
| **Ranunculaceae** | *Delphinium parryi subsp. parryi* | San Bernardino larkspur | |
| **Ranunculaceae** | *Delphinium patens* | spreading larkspur | |
| **Ranunculaceae** | *Delphinium patens subsp. hepaticoideum* | spreading larkspur | |
| **Ranunculaceae** | *Ranunculus californicus* | California buttercup | FAC |
| **Rhamnaceae** | *Ceanothus crassifolius* | hoary leaved ceanothus | |
| **Rhamnaceae** | *Ceanothus cuneatus* | buckbrush | |
| **Rhamnaceae** | *Ceanothus cuneatus var. cuneatus* | buckbrush | |
| **Rhamnaceae** | *Ceanothus cyaneus* | Lakeside ceanothus | RARE |
| **Rhamnaceae** | *Ceanothus megacarpus* | big pod ceanothus | |
| **Rhamnaceae** | *Ceanothus megacarpus var. megacarpus* | big pod ceanothus | |
| **Rhamnaceae** | *Ceanothus oliganthus* | hairy ceanothus | |
| **Rhamnaceae** | *Ceanothus spinosus* | greenbark ceanothus | |
| **Rhamnaceae** | *Rhamnus californica* | California coffeeberry | |
| **Rhamnaceae** | *Rhamnus crocea* | redberry buckthorn | |
| **Rhamnaceae** | *Rhamnus ilicifolia* | hollyleaf redberry | |
| **Rosaceae** | *Adenostoma fasciculatum var. fasciculatum* | chamise | |
| **Rosaceae** | *Cercocarpus betuloides* | birch-leaf mountain-mahogany | |
| **Rosaceae** | *Cercocarpus betuloides var. betuloides* | birch-leaf mountain-mahogany | |
| **Rosaceae** | *Fragaria vesca* | California strawberry | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Rosaceae** | *Heteromeles arbutifolia* | Toyon | |
| **Rosaceae** | *Holodiscus discolor* | Ocean spray | FAC |
| **Rosaceae** | *Horkelia cuneata* | wedge-leaf horkelia | |
| **Rosaceae** | *Potentilla glandulosa* | Common cinquefoil | FAC |
| **Rosaceae** | *Prunus ilicifolia* | holly leaf cherry | |
| **Rosaceae** | *Prunus ilicifolia subsp. ilicifolia* | holly leaf cherry | |
| **Rosaceae** | *Rosa californica* | California wild rose | FAC |
| **Rubiaceae** | *Galium angustifolium subsp. angustifolium* | narrowleaf bedstraw | |
| **Rubiaceae** | *Galium aparine* | common bedstraw | FACU |
| **Rubiaceae** | *Galium cliftonsmithii* | Santa Barbara bedstraw | |
| **Rubiaceae** | *Galium porrigens* | Nuttall's bedstraw | |
| **Rubiaceae** | *Galium porrigens var. porrigens* | Nuttall's bedstraw | |
| **Salicaceae** | *Populus fremontii* | Fremont cottonwood | FACW |
| **Salicaceae** | *Salix lasiolepis* | arroyo willow | FACW |
| **Saxifragaceae** | *Lithophragma affine* | common woodland star | |
| **Saxifragaceae** | *Lithophragma affine subsp. mixtum* | common woodland star | |
| **Saxifragaceae** | *Saxifraga californica* | California saxifrage | |
| **Scrophulariaceae** | *Antirrhinum coulterianum* | Coulter's snapdragon | |
| **Scrophulariaceae** | *Antirrhinum kelloggii* | Kellogg's snapdragon | |
| **Scrophulariaceae** | *Antirrhinum multiflorum* | Withered Snapdragon | |
| **Scrophulariaceae** | *Antirrhinum nuttallianum* | Nuttall's snapdragon | |
| **Scrophulariaceae** | *Castilleja affinis* | Indian paintbrush | |
| **Scrophulariaceae** | *Castilleja affinis subsp. affinis* | Indian paintbrush | |
| **Scrophulariaceae** | *Castilleja applegatei subsp. martinii* | wavyleaf Indian paintbrush | |
| **Scrophulariaceae** | *Castilleja exserta* | purple owl's clover | |
| **Scrophulariaceae** | *Castilleja foliolosa* | Texas paintbrush | |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Scrophulariaceae** | *Collinsia heterophylla* | purple Chinese houses | |
| **Scrophulariaceae** | *Cordylanthus rigidus subsp. setigerus* | bristly bird's beak | |
| **Scrophulariaceae** | *Keckiella cordifolia* | climbing penstemon | |
| **Scrophulariaceae** | *Linaria canadensis* | blue toad flax | |
| **Scrophulariaceae** | *Mimulus aurantiacus* | sticky monkeyflower | |
| **Scrophulariaceae** | *Mimulus aurantiacus var. pubescens* | sticky monkeyflower | |
| **Scrophulariaceae** | *Mimulus aurantiacus var. puniceus* | sticky monkeyflower | |
| **Scrophulariaceae** | *Mimulus brevipes* | wide throated yellow monkeyflower | |
| **Scrophulariaceae** | *Mimulus guttatus* | seep monkeyflower | OBL |
| **Scrophulariaceae** | *Penstemon centranthifolius* | scarlet bugler | |
| **Scrophulariaceae** | *Penstemon heterophyllus* | foothill penstemon | |
| **Scrophulariaceae** | *Penstemon heterophyllus var. australis* | southern foothill penstemon | |
| **Scrophulariaceae** | *Penstemon spectabilis* | showy penstemon | |
| **Scrophulariaceae** | *Scrophularia californica* | California Bee plant | FAC |
| **Solanaceae** | *Datura wrightii* | Jimson weed | |
| **Solanaceae** | *Solanum americanum* | American black nightshade | FAC |
| **Solanaceae** | *Solanum douglasii* | Douglas' nightshade | FAC |
| **Solanaceae** | *Solanum umbelliferum* | blue witch nightshade | |
| **Solanaceae** | *Solanum xanti* | chaparral nightshade | |
| **Solanaceae** | *Solanum xanti var. intermedium* | chaparral nightshade | |
| **Typhaceae** | *Typha latifolia* | broadleaf cattail | OBL |
| **Urticaceae** | *Hesperocnide tenella* | western stinging nettle | |
| **Urticaceae** | *Parietaria hespera* | western pellitory | |
| **Urticaceae** | *Parietaria hespera var. hespera* | western pellitory | |
| **Urticaceae** | *Urtica dioica subsp. holosericea* | giant creek nettle | FACW |
| **Verbenaceae** | *Verbena lasiostachys* | Common verbena | FAC |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Verbenaceae** | *Verbena lasiostachys var. lasiostachys* | Common verbena | FAC |
| **Violaceae** | *Viola pedunculata* | California Golden Violet | |
| **Vitaceae** | *Vitis girdiana* | Southern california grape | |

## APPENDIX 5.
### FLORA OF INGLEWOOD AND CENTINELA CREEK FROM HERBARIUM RECORDS

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Apiaceae** | *Perideridia parishii subsp. latifolia* | wide leaved Parish's yampah | FACW |
| **Apiaceae** | *Sanicula arguta* | sharp toothed snakeroot | |
| **Asteraceae** | *Artemisia californica* | California sagebrush | |
| **Asteraceae** | *Centromadia parryi subsp. australis* | Parry's tarweed | FAC |
| **Asteraceae** | *Cirsium brevistylum* | Indian thistle | |
| **Asteraceae** | *Ericameria palmeri var. pachylepis* | broad scaled Palmer's goldenbush | |
| **Asteraceae** | *Gnaphalium palustre* | western marsh cudweed | FACW |
| **Asteraceae** | *Grindelia hirsutula* | hairy gumweed | FACW |
| **Asteraceae** | *Heterotheca grandiflora* | telegraphweed | |
| **Asteraceae** | *Lasthenia glabrata subsp. coulteri* | yellowray goldfields | FACW |
| **Asteraceae** | *Psilocarphus brevissimus* | woolly marbles | OBL |
| **Asteraceae** | *Stephanomeria exigua subsp. exigua* | slender stephanomeria | |
| **Boraginaceae** | *Pectocarya linearis subsp. ferocula* | sagebrush combseed | |
| **Brassicaceae** | *Rorippa palustris subsp. occidentalis* | western bog yellow cress | OBL |
| **Brassicaceae** | *Sibara virginica* | common rock cress | FAC |
| **Caryophyllaceae** | *Spergularia macrotheca var. leucantha* | sticky sandspurry | FAC |
| **Caryophyllaceae** | *Spergularia marina* | salt marsh sand spurry | OBL |
| **Chenopodiaceae** | *Atriplex serenana var. serenana* | saltscale | FAC |
| **Chenopodiaceae** | *Chenopodium californicum* | soaproot | |
| **Convolvulaceae** | *Calystegia macrostegia subsp. intermedia* | south coast morning-glory | |
| **Convolvulaceae** | *Cressa truxillensis* | spreading alkaliweed | FACW |
| **Convululaceae** | *Calystegia macrostegia ssp. intermedia* | south coast morning glory | |
| **Cyperaceae** | *Eleocharis acicularis* | needle spikerush | OBL |
| **Cyperaceae** | *Eleocharis acicularis var. acicularis* | needle spikerush | OBL |
| **Cyperaceae** | *Eleocharis macrostachya* | common spikerush | OBL |
| **Cyperaceae** | *Scirpus californicus* | California tule | OBL |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Cyperaceae** | *Scirpus maritimus* | prairie bulrush | OBL |
| **Elatinaceae** | *Elatine brachysperma* | short-seed waterwort | FACW |
| **Euphorbiaceae** | *Chamaesyce albomarginata* | rattlesnake weed | |
| **Euphorbiaceae** | *Croton setigerus* | dove weed | |
| **Fabaceae** | *Astragalus tener var. titi* | alkali milk-vetch | FACW |
| **Fabaceae** | *Astragalus trichopodus var. lonchus* | Santa Barbara milk-vetch | |
| **Fabaceae** | *Lotus heermannii* | Heermann's lotus | |
| **Fabaceae** | *Lotus strigosus* | Hairy Lotus | |
| **Fabaceae** | *Lotus strigosus var. hirtellus* | Hairy Lotus | |
| **Fabaceae** | *Lotus strigosus var. strigosus* | Hairy Lotus | |
| **Fabaceae** | *Lupinus bicolor subsp. microphyllus* | miniature lupine | |
| **Fabaceae** | *Trifolium ciliolatum* | foothill clover | |
| **Fabaceae** | *Trifolium gracilentum* | pinpoint clover | |
| **Fabaceae** | *Trifolium willdenovii* | tomcat clover | |
| **Malvaceae** | *Sidalcea malviflora subsp. sparsifolia* | dwarf checkerbloom | |
| **Onagraceae** | *Camissonia lewisii* | Lewis' evening primrose | |
| **Onagraceae** | *Camissonia strigulosa* | sandysoil suncup | |
| **Onagraceae** | *Epilobium pygmaeum* | smooth boisduvalia | OBL |
| **Plantaginaceae** | *Plantago elongata* | coastal plantain | FACW |
| **Plantaginaceae** | *Plantago subnuda* | tall coastal plantain | FACW |
| **Poaceae** | *Agrostis viridis* | green bentgrass | |
| **Poaceae** | *Alopecurus carolinianus* | Carolina foxtail | FACW |
| **Poaceae** | *Bromus carinatus* | California brome | |
| **Poaceae** | *Phalaris lemmonii* | Lemmon's canarygrass | FACW |
| **Poaceae** | *Phalaris minor* | littleseed canarygrass | |
| **Poaceae** | *Poa secunda* | one sided blue grass | FACW |

| Family | Species | Common Name | Wetland |
|---|---|---|---|
| **Polemonaceae** | *Navarretia fossalis* | spreading navarretia | |
| **Polemoniaceae** | *Gilia angelensis* | chaparral gilia | |
| **Polemoniaceae** | *Linanthus dianthiflorus subsp. dianthiflorus* | fringed linanthus | |
| **Polemoniaceae** | *Navarretia prostrata* | prostrate pincushionplant | OBL |
| **Polemoniaceae** | *Saltugilia splendens ssp. spendens* | | |
| **Portulacaceae** | *Calandrinia ciliata var. menziesii* | red maids | FACU |
| **Ranunculaceae** | *Ranunculus californicus* | California buttercup | FAC |
| **Rosaceae** | *Heteromeles arbutifolia* | Toyon | |
| **Salicaceae** | *Salix lasiolepis* | arroyo willow | FACW |
| **Solanaceae** | *Solanum douglasii* | Douglas' nightshade | FAC |
| **Verbenaceae** | *Verbena bracteata* | bigbract verbena | FACW |
| **Verbenaceae** | *Verbena lasiostachys var. lasiostachys* | Common verbena | FAC |
| **Violaceae** | *Viola pedunculata* | California Golden Violet | |