Informing the Future of the Santa Monica Airport: Scientific Insights & Historical Perspectives

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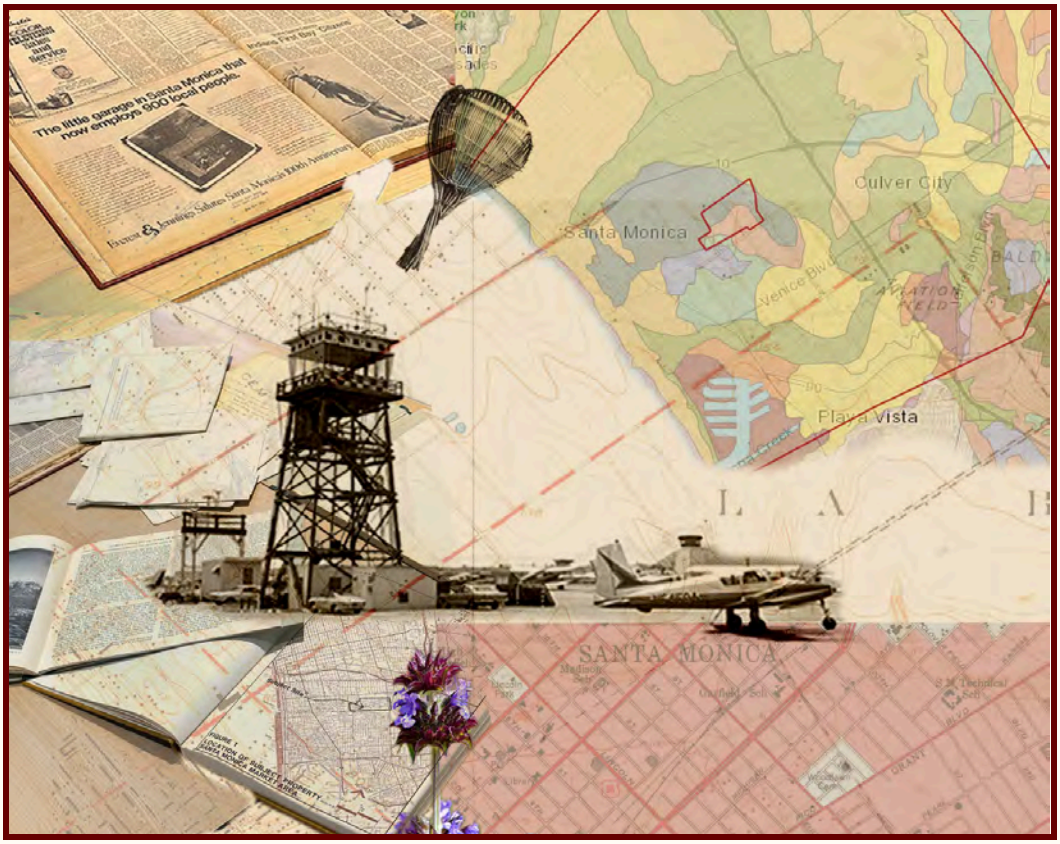


Table of Contents

Abstract

In 2017, the City of Santa Monica reached a monumental milestone by reaching a settlement with the Federal Aviation Administration. As a part of this agreement, the 192-acre Santa Monica Airport (SMO) will transition to local control after 2028. The City of Santa Monica plans to transform the space to local community use. The process of planning the future of the site is well underway, with Sasaki, a landscape architecture firm, selected as the principal designer in late 2023. In addition, community engagement meetings began at the start of 2024 to include local residents' input in the planning process.

Among various proposals for the airport's future, the most popular is to transform the airport into a "great park." This concept aims to provide new recreational spaces, ecological restoration, and education opportunities for the community. This practicum project has two primary objectives:

1. **Comprehensive Research:** Gather all relevant information on the physical, ecological, and human characteristics of the SMO site. This includes historical data dating back to the airport's development in the 1920s. As a result, we aim to create a historically accurate description of SMO.

2. **Effective Communication**: To present this abundant information in a digestible and visually appealing manner. We aim to engage with the public through communication channels to ensure everyone understands the airport's transformation and its potential benefits for public outreach.

Introduction

In partnership with the City of Santa Monica, our research team conducted an extensive study of the historical landscape associated with the Santa Monica Airport. Our primary objective was to assist the city's efforts in transitioning the airport to a vibrant public space that not only aligns with its natural surroundings but pays tribute to its rich historical legacy following its closure at the end of 2028. By thoroughly examining the airport's past and assessing its past ecological condition, our project aims to lay the groundwork for a future that respects and honors the land's history while fostering stronger connections between the local communities and the native ecosystems.

To gain deeper insights into our site of interest and its historical context, we focused our research on the following subtopics:

- The history and evolution of the Santa Monica area
- Los Angeles Geomorphology

- Topography
- Hydrology
- Ecology (flora and fauna)
- People and how they shaped the land

By examining information from these various fields, our project aims to provide a knowledgeable foundation required to begin more comprehensive, site-specific research in 2024.

Airport Background

The story of the Santa Monica Airport began in 1917 when an open stretch of land in the area served as an informal landing strip for their World War I biplanes (City of Santa Monica, n.d.). The founding of Douglas Aircraft Company in 1922 led to the "production and testing of military and civilian aircraft" in the area (City of Santa Monica). By 1924, the site was named Clover Field by the Army Air Corps, commemorating a fighter pilot who was killed in action (City of Santa Monica). After being the first aircraft to circumnavigate the globe, the Douglas Air Cruiser brought significant publicity to Clover Field, and in 1926, the city acquired the airport property through a municipal election. In 1927, Clover Field officially became Santa Monica Airport.

During World War II, the Douglas Aircraft Company became a defense contractor with 44,000 employees operating in and near the Santa Monica Airport (City of Santa Monica). This marked a period of significant economic growth and led to the construction of thousands of homes for workers and their families, creating lasting neighborhoods like Sunset Park. The airport continued to grow through the 1940s and '50s with pilots and soldiers returning from war. Extremely loud and polluting civilian jets arrived at the airport beginning in the 60s, triggering frustrated residents to call the first of many community hearings (City of Santa Monica). Eventually, these hearings would lead to court cases between the airport and the city of Santa Monica.

After nearly five decades of litigation and strategic investments of resources to gain local control, the City of Santa Monica achieved a significant milestone in 2017. A settlement with the Federal Aviation Administration (FAA) granted the city authority over the Santa Monica airport, marking a pivotal moment for the future of the city (City of Santa Monica Staff Report, 2023). This project entered a new phase on January 24, 2023, when the Santa Monica City Council approved a public process to determine the airport's future, reflecting a commitment to community engagement in shaping the urban space (City of Santa Monica). In late 2023, the design firm Sasaki was chosen as the consultant for this project.

Among the various proposals for the airport's future, the most popular idea is to transform the airport into a "great park" (City of Santa Monica Staff Report, 2023). This project summarizes the historical conditions of the Santa Monica Airport site not as a static, untouched

piece of land but as a dynamic landscape shaped by both natural and human processes that began long before its colonization by Europeans. Understanding the historical, ecological, and cultural aspects of the area, including soil composition, water distribution, and habitat types, is critical for planners to create a sustainable future for the site.

Methods and Approach

Collecting Historical Data

The first stage of this landscape history project included gathering all relevant data about the SMO site's conditions during the 19th and early 20th centuries. Digital databases like Calisphere and UCLA Library's special collections and digital archives were utilized to search for any assets–maps, newspapers, books, photography, magazines, or other written or visual records–related to SMO before 1930. Search queries began with terms including "Santa Monica Airport," "Clover Field Airport," "Douglas Aircraft Company," "Ecology," "Flora," "Fauna," "Animal," Plant," "Hydrology," "Water," "Topography," "Soil" or other terms related to landscape and ecosystem. After initial findings of historical property records and SMO's relationship to nearby watersheds, the search was expanded to include "Rancho la Ballona" and "Ballona Creek."

Other digital archives included location-based search queries in which an area of interest was selected, and resources related to the region were returned. These included the USGS topographic map explorer and the Consortium of California Herbaria Portal 2 (CCH2).

In addition to searching digital archives, the research team consulted with local institutions, including the Santa Monica Library, the Santa Monica History Museum, and the Spence Air Photo Collection at Benjamin and Gladys Thomas Air Photo Archives in the UCLA Department of Geography to access digital and physical records of the airport site. Curators were asked to gather any resources related to the history of SMO, and during site visits, relevant assets were digitized and noted. Some assets were not included in this project due to sharing restrictions placed by their institutions. A full archive of both digital and physical assets, including data type, institution, and topic, is included in the deliverables section. Many written records returned by search queries describe conditions in the Santa Monica Mountains rather than the SMO site.

All assets, including individual maps, images, and books, were compiled into a tracking database that includes an asset ID and meta ID that correspond to the source type. Additional information, including date accessed, asset year, author, scale, type, and source were noted. The full asset tracker is in the deliverables section. After gathering a comprehensive database of assets related to the SMO site, topic teams investigated individual assets to build an understanding of the geomorphology, topography, hydrology, flora, fauna, and human characteristics of the SMO site. Herbarium records, as well as other flora and fauna-related sources, contributed to an additional native plant catalog, which will be described in a later

section. Two projects: the Los Angeles Landscape History Project and The Reconnecting Riverside with its River Project, both served as inspiration for this project.

Digitizing Water Features

To compile a comprehensive map of the historical Santa Monica watershed, information from georeferenced U.S. Geological Survey (USGS) topographic maps was transferred into an interactive ArcGIS Online format (see deliverable 4 for more details). USGS manages a database of topographic survey maps that have been aligned to a ground coordinate system or georeferenced to allow for relevant spatial analysis. This methodology follows practices used for the digitizing water features section of the LA Landscape History Project, "Mapping Los Angeles Landscape History: The Indigenous Landscape," to transfer historic water features to a separate layer for visualization (Longcore and Ethington, 2023).

Within the USGS topographic map explorer's "find a place" function, the Santa Monica Airport was selected as a point of interest, and all maps encompassing it were generated. From the long timeline of maps available, only maps dated earlier than 1930 with identifiable water features were used. This included three 1:62500 scale maps (Santa Monica 1898, Santa Monica 1902, Redondo 1896) and five 1:24000 scale maps (Sawtelle 1925, Topanga Canyon 1928, Inglewood 1924, Hollywood 1926, Venice 1924). Each map was imported to a linked ArcGIS online account directly from the USGS Topographic Map Explorer.

In ArcGIS online, an area of interest sketch layer was drawn, including the borders of the Santa Monica Airport and a regional radius stretching from the base of the Santa Monica Mountains to the Culver City border and south to Marina del Rey and the Baldwin Hills area. This ensured the greater watershed characteristics relevant to Santa Monica would be present in the final water features layer.

The LA Landscape History Project used a water features layer that allows a user to add lines and polygons to trace streams and waterbodies using the edit feature in ArcGIS online. This layer served as a template that was laid over the USGS base maps. Using the edit function in the water features layers, any streams, intermittent streams, or rivers were traced with lines, and water bodies, including wetlands, vernal pools, lakes, and ponds, were traced with a polygon. Each feature was labeled according to the legend of the base map. Since the base maps covered large areas, only water features that intersected the area of interest were included. The final water features layer was then used with a historic soil layer and shaded relief base map for visualization (Figure 9).

Compiling an Herbarium Record Catalog

As part of our deliverables, we aimed to contribute to ecological historical research by analyzing herbarium records specific to the Santa Monica area. In the initial data collection

phase, our team conducted extensive research on Santa Monica plants. We consulted scholarly research articles, explored library resources from the Santa Monica Public Library and the UCLA Herbarium Library, herbarium, books, and contacted local botanist experts. After the initial data collection, we decided to conceptualize what our final deliverable would look like. We drew inspiration from the Plant Palettes in the "Reconnecting Riverside with its River" project (San Francisco Estuary Institute, 2023). The Plant Palettes are plant tables and provide comprehensive information on historical Riverside plants. This plant table information includes scientific and common names, plant types, wildlife supports, cultural uses, flowers, bloom time, soil, drainage, and ease of care. Our methodology also involved leveraging the Consortium of California Herbarium (CCH2) database. This project served as a model for this practicum project due to its effective and clear presentation of large amounts of plant data. Additionally, we were intrigued by the project's inclusion of cultural uses.

Our herbarium records search began by examining literature from the early 1900s, with a specific focus on LeRoy Abrams' work, *Flora of Los Angeles and Vicinity*. Within this book, we documented any mentions of Santa Monica and its neighboring areas. The book obtained the scientific names of the plants and a short description of where the plants were found. To ensure accuracy, we cross-referenced historical city and neighborhood names with their contemporary names known today. We explored areas of Santa Monica (excluding mentions of Santa Monica Mountains), Venice, Sawtelle, Soldier's Home, Palms, Westgate, La Ballona, Home Junction, Rincon De los Buyes, Playa del Rey – each sharing similar climate conditions and topography. Ultimately, we consolidated all relevant plant data from these areas into a collaborative Google Document.

We used the map search feature on the Specimen data from the Consortium of California Herbaria website (CCH2) to find occurrence data of plants in the area surrounding the Santa Monica Airport. The website allows you to save the herbarium data in CSV format. The website provided two spreadsheets, one for species occurrences and identification information. We performed a join on the occurrence table and the identification data by using the ID numbers to create one CSV file.

After the join, we cleaned up the table by dropping column names to create a presentable table for final deliverables. Additionally, mentions of plants from *Flora of Los Angeles and Vicinity* were added to the CCH2 data table.

We used a variety of sources to add more data to our table. Following the inspiration from the Plant Palettes, we added new columns, including common name, native/introduced status, year(s) identified, Indigenous use, and wildlife supports/common uses. We found common names, native or introduced status, and indigenous use using the USDA Plants Database and Calscape website service from the California Native Plant Society. Indigenous uses were found in the book *Tending the Wild* by M. Kat Anderson (2005). We also utilized the "Tongva Medicinal Plants Catalog" website to find Kizh (Tongva) uses for native plants. We searched for

each plant's scientific name in all of the sources. The USDA Plants Database has a search feature allowing scientific name searches. We used that feature to search for each plant from the table. The USDA Plants Database also has plant guides for many of the plants in our table. The plant guides provided information on common and ethnobotanical uses.

Story Map Methods

We constructed a StoryMap to create a shareable synthesis of our research. StoryMaps are a website format developed by Esri (Redlands, California) that embeds images, audio, video, and interactive maps. We first identified the need for a StoryMap when we realized we wanted a way to provide an accessible and digestible form of our scientific research on the historical ecology of the site for the City of Santa Monica, Sasaki, and the public.

With much of our data already collected, we created an outline for the story map that included sections that corresponded with the categories of our research: geomorphology, topography, hydrology, flora and fauna, and people. This order was chosen because it follows the natural progression from the foundational physical features and processes to the life on which the land sustains. After determining the order, we synthesized our research into sections of narrative writing and combined them into one document to analyze the pieces of our story together. We made copy edits, removed repetitive overlap, and added an introduction and conclusion.

With the writing of our story map complete, we performed analogous research on story maps that provided a simple yet strong design. Using such inspiration as well as the City of Santa Monica's colors, we designed a theme for the story map in ArcGIS' story map builder. From the themes builder, we selected "+ New theme" and adjusted the colors, typography, and formatting of the buttons, quotes, links, separators, and base map. The design colors were chosen with not only the city's branding in mind but also accessibility. We chose high-contrast colors that adhere to Web Content Accessibility Guidelines (WCAG) for the text and graphical elements, ensuring the content is readable to everyone (WebAIM).

We loaded the theme by selecting the design tab and clicking on our new theme within the editor. We then added the text from our narrative document, as well as corresponding images and maps from our research. After loading everything in, we proofread the content and analyzed the text flow and visual elements.

Results

Geomorphology and Topography

According to the California Department of Conservation, Santa Monica consists of older alluvium, lake, playa, and terrace deposits that were formed around the Pleistocene epoch, a geological epoch that lasted from c. 2.58 million to 11,700 years ago. The soil has a dark yellow color and with efficient drainage. However, the current topsoil composition of the airport is predominantly a layer of asphalt with some areas of dirt. The Santa Monica Mountains expose the makeup of the basement rocks of the region, which consist of clastic sedimentary layers from the late Cretaceous to Pleistocene periods and volcanic rock from the middle Miocene (Yerkes, 1965).

On the Northern coast at the base of the Santa Monica Mountains lies Santa Monica. The Los Angeles Basin has a surprisingly steep relief and complex structure for its young age and size (Yerkes, 1965). Significant changes in rates of deposition over the course of its history combined with more recent folding and faulting from tectonic activity resulted in "pronounced lateral variations in lithology and thickness in most of the sedimentary rock units" (Yerkes, 1965, p. A15). Movement in tectonic plates uplift sedimentary rocks towards the surface. The rock types in this area show that this geology was presumably the result of uplifted rocks from the Santa Monica Mountains that were later deposited onto the site.

Near Ohio Avenue, unconsolidated sediments make up the surface to a depth of about 20 meters, where there is a thin layer of saturated sediments followed by solid sedimentary rock (Catchings et al., 2008). Within this solid layer, there are various intrusions, including the metamorphic rock slate, which is formed by subjecting shale to intense heat and pressure (Catchings et al., 2008). There is significant regional variation in the surface layer size and composition, but this site serves as a general approximation of the immediate surrounding area. The Santa Monica fault and associated scarps traverse various depths and contribute to earthquake risks in the area.

Though it is difficult to recognize today under streets, homes, airport buildings, and runways, the Santa Monica airport sits on top of an elevated bluff. The top of the bluff was flattened and paved to build the airport's runway and surrounding infrastructure. An 1888 map of Rancho La Ballona shows the extent of this bluff in a time with minimal human development. From this vantage point, one had a sprawling view of the Santa Monica Bay to the southwest, the Santa Monica Mountains to the north, and the Ballona Wetlands to the southeast. The Cheviot and Baldwin hills, part of the Newport-Inglewood Structural zone, lie to the east.

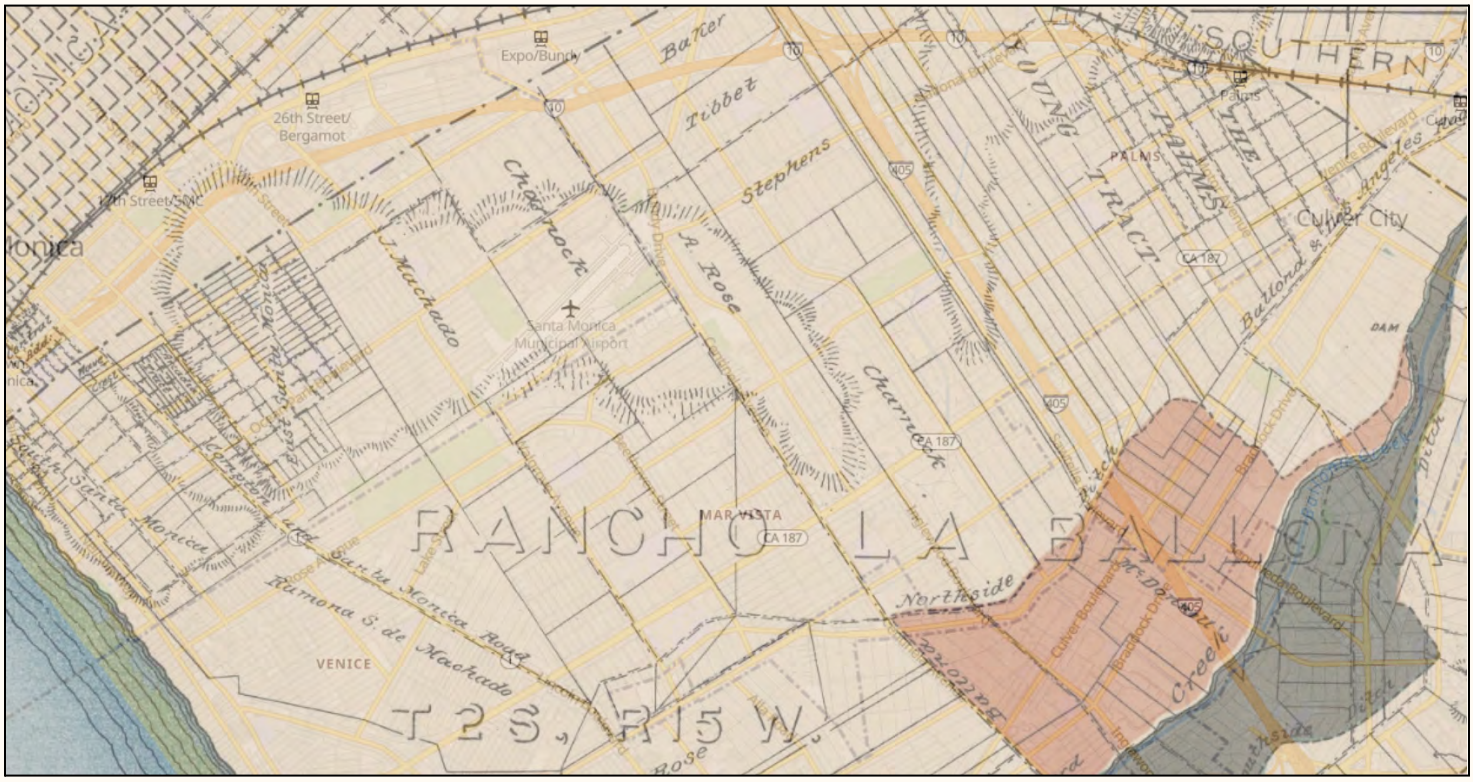


Figure 1. 1888 property map of Rancho La Ballona overlaid on a modern map showing the historical extent of the bluff SMO now sits on (Hall 1888).

Historical property maps described Santa Monica's general topography for existing and prospective land owners. The SMO site was part of a large property called Rancho La Ballona through the late 1800s and early 1900s. A map of Rancho La Ballona from 1888 overlaid on a modern map of Santa Monica confirms that SMO stretches across an elevated bluff. The runways' northeastern and southwestern corners directly overlook the bluff edge. This historical topography forms the foundation to understand water flows, soil conditions, and lifeforms that once called the region home.

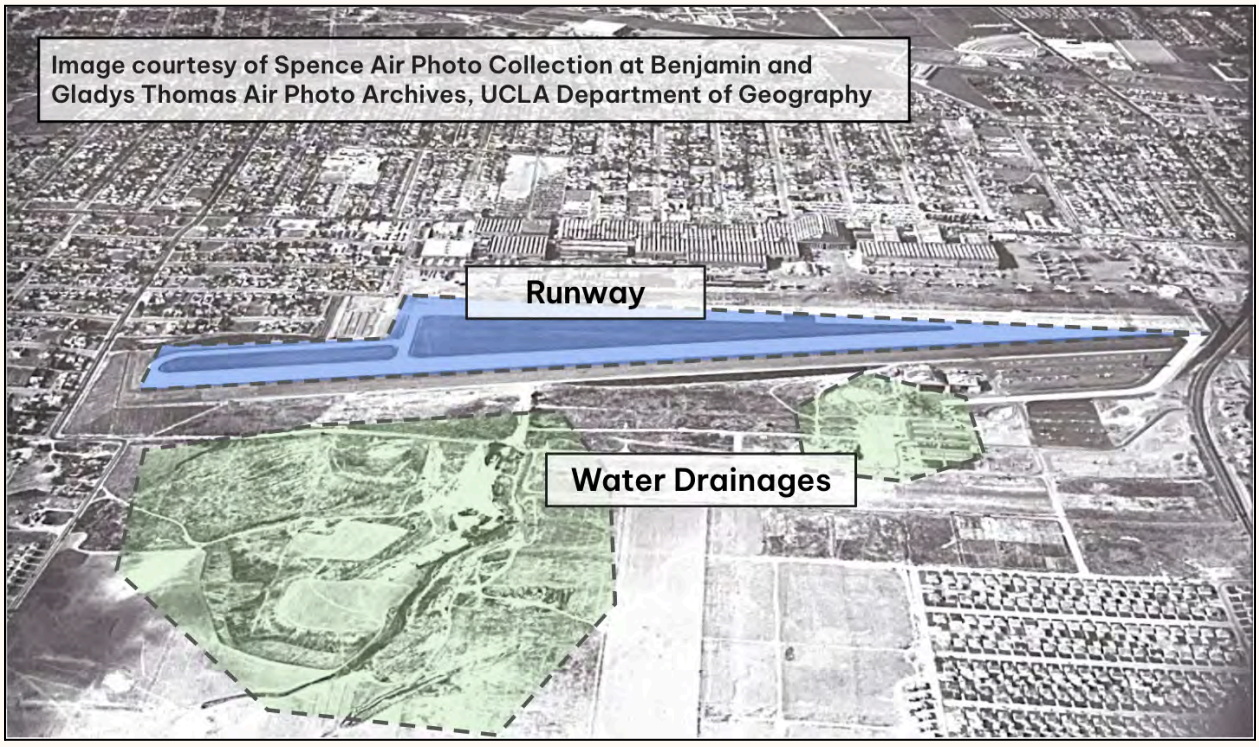


Figure 2. 1950 oblique aerial image with SMO runway (blue) and water drainages (green)

Aerial views from 1950s historic maps of the Santa Monica Airport show the runway atop the flattened bluff. Small inclines along the edges of the runway show the area is still elevated, but any topographic features on the bluff have been eliminated. While this is great for an airport, providing a high vantage point and landing strip, it completely removes any local plants or natural hills and bumps that animals can explore safely. On the airport's southern edge, small canyons and alluvial action suggest the bluff drains southward, and natural drainages persisted well into the 20th century.

Hydrology

Understanding historic water flows offers valuable insight into environmental conditions and helps us understand the extent to which SMO has changed over time. The digitized waterways map created using USGS topographic maps visualizes historic water patterns stretching from the Santa Monica Mountains to Ballona Creek.

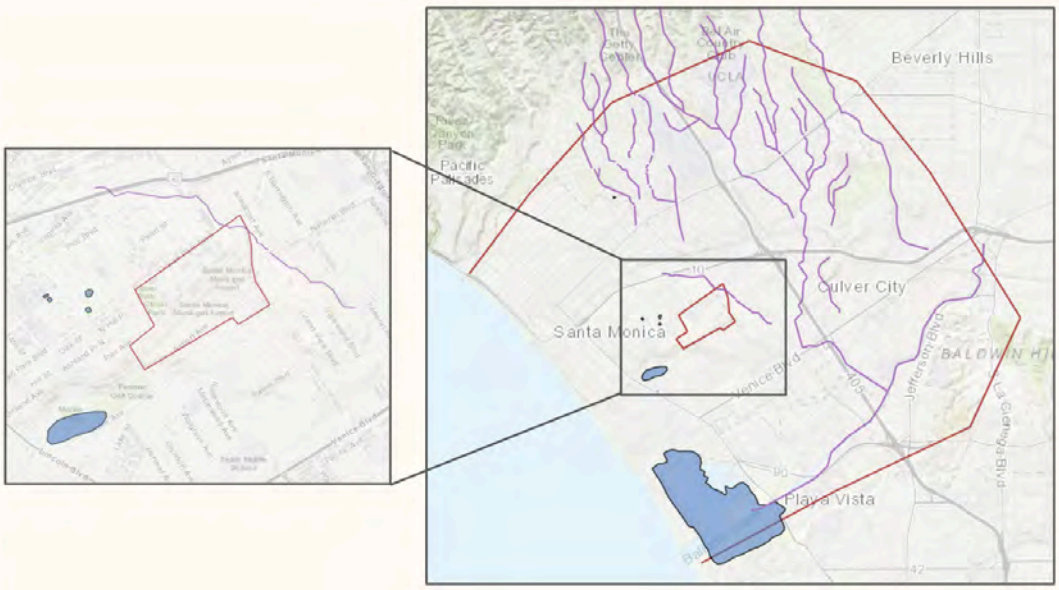


Figure 3. A digitized map of historic (pre 1930) hydrology of the SMO site and surroundings. Notably, an ephemeral stream crosses the northeast corner of SMO, and the elevated bluff drained into a vernal pool at its base in the southwest.

Historically, streams flowed from the Santa Monica Mountains into the basin, through the city, and into the Santa Monica Bay. Before intense human development, these streams were highly dynamic and free to meander through the region. One ephemeral stream flowed across the northern corner of the Santa Monica Airport site, following the path of Bundy Drive. Water from the elevated bluff drained to the southwest into a vernal pool at its base, in the present location of Penmar Golf Course.

Figure 4. A 1925 USGS topographic map depicts SMO's ephemeral stream as a dotted blue (left). Aerial photograph (C-300 J-286) from a 1/1/1928 flight shows erosion and vegetation along the stream path, highlighted in blue (right).

The stream northeast of the bluff is depicted in the early 20th century on a topographic map of the Sawtelle area in 1925. It is the small dotted blue line next to the aviation field that follows the path of present-day Bundy Drive. Ephemeral streams fill during LA's wet winters and remain dry most of the year. The stream did not connect to other creeks or the ocean in either direction. Rather than draining across the airport, it would have filled and infiltrated into the ground. The stream's path was confirmed by cross-referencing aerial photography. In a 1928

aerial photograph, a meandering line of vegetation and erosion characteristic of a stream winds past the airport. There are also smaller-scale drainages visible toward the southern border of the golf course. By 1934, the airport and surrounding neighborhoods expanded, and the stream no longer extended past the airport site. By 1950, the airport had grown further, and regional water flows were covered or channelized.

Figure 5. A 1934 USGS topographic map shows the stream no longer crosses the airport site.

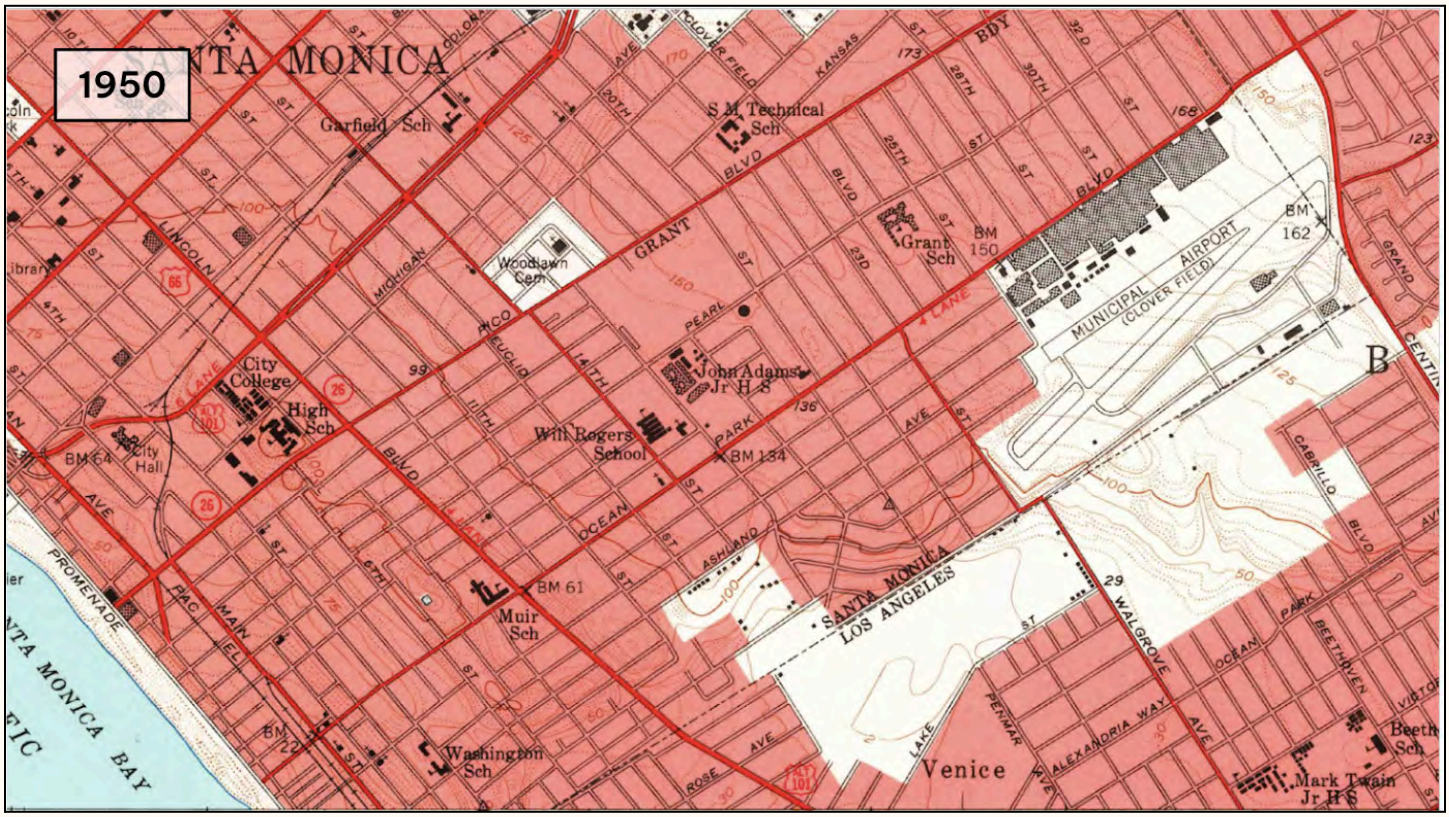


Figure 6. A 1950 USGS topographic map emphasizes the extent of SMO's growth and surrounding urbanization.

Grooves carved out of the southern border of the bluff the airport sat on suggest smaller ephemeral streams brought water from the top of the bluff to the lower-lying area below (USGS TOPO, HABITAT MAP). This water would collect in vernal pools surrounded by a wet meadow. Constant seasonal rain cycles caused the repeated filling and drying of this area, leading to the high alkalinity of the soil there.

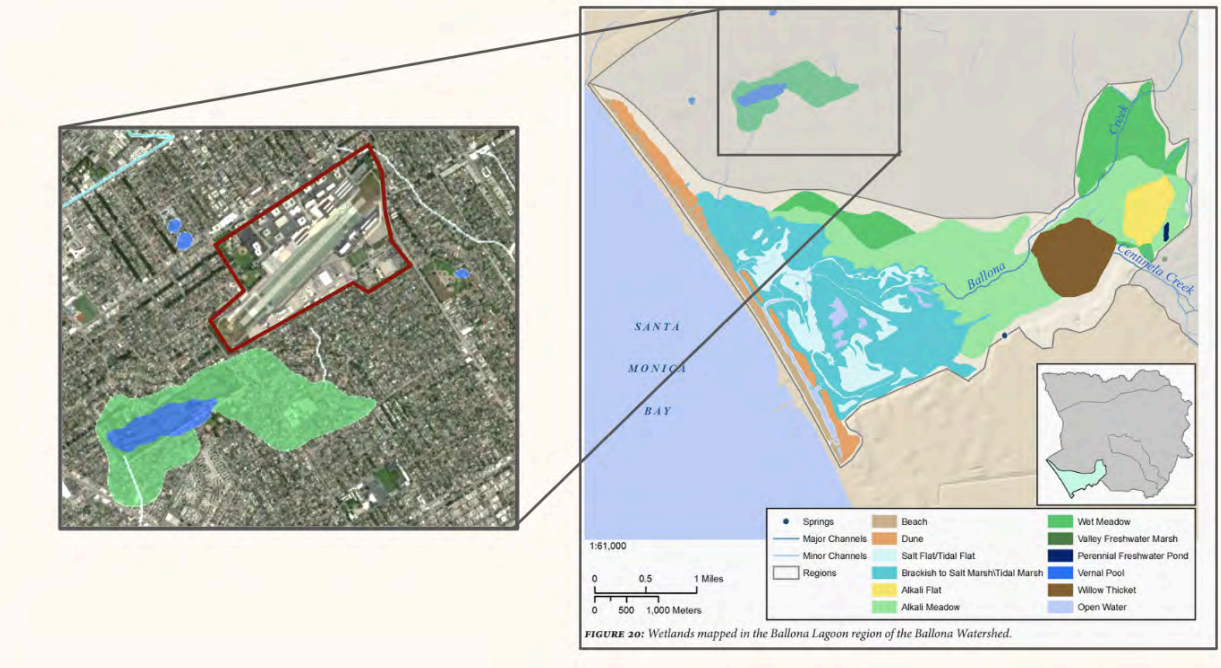


Figure 7. A map of historical water and habitat features (Dark et al., 2011) shows vernal pool and wet meadow to the southwest of SMO.

Seasonal cycles of filling and drying lead to the specific soil conditions that once supported native flora. The Ballona Historical Ecology project (Dark et al., 2011) described the historical water features and habitats surrounding Ballona Creek. After these features are compared on a modern map, it becomes clear that the drainages on the southern side of the airport would have filled a vernal pool at Penmar Golf Course's present-day location. Like ephemeral streams, vernal pools fill during the wet season and dry out during the rest of the year. A wet meadow once covered the low-lying area surrounding the vernal pool.

Ecology and Soils

Understanding soil composition is an important indicator of SMO's historical habitat types and potential to support new flora. It is impossible to see anything through the current layer of asphalt at SMO, so we looked at historical maps and recent boring tests to verify soil conditions under the airport.

Figure 8. Historical soils map indicates that the SMO site consists of sandy loam soil (Mesmer, 1903).

Historical soil maps show that most of the soil underneath SMO is Sandy Loam. Boring tests conducted by the airport in 2022 confirm that despite profound changes to its appearance and ecology, SMO soil has retained its sandy loam characteristics, which means it may be able to support the same flora that once inhabited the region. This soils map has been previously digitized, providing an opportunity to effectively visualize SMO and its soil at a high resolution (Longcore & Ethington, 2023).

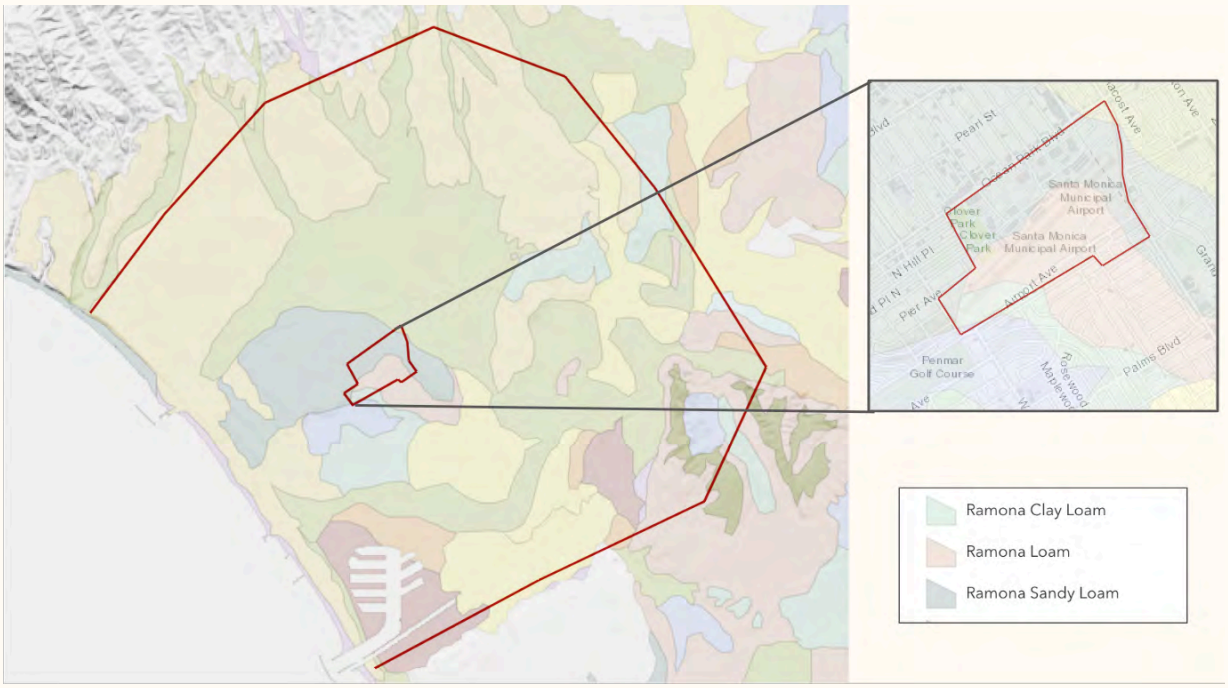


Figure 9. Digitized soils map (Lam et al. 2007) shows that the airport sits Ramona Clay Loam, Ramona Loam, and Ramona Sandy Loam

The clay content, water retention, and drainage capacity of sandy loam supported the coastal sagebrush flora that used to cover the ground. Historical books (*Tending the Wild)* indicate that indigenous communities used controlled burns to cultivate chia, among other plants collected for food, while settlers conducted slash-and-burn farming methods to boost soil fertility (boosting nitrogen and phosphorus nutrients) for barley and beans. These human activities can influence soil chemistry and nutrient content over time.

Santa Monica is situated in a Mediterranean climate characterized by hot, dry summers and mild, wet winters. This climate shapes a diverse ecosystem, where species have evolved to withstand wildfires and developed strategies to minimize water loss. The airport's past ecology contrasts sharply with its current state. The airport site once hosted a coastal sage community – a diverse assembly of plants that thrives along the coastal terraces and foothills of Southern California and Northwestern Mexico.

Coastal sage scrub vegetation typically features aromatic shrubs with widespread complex roots and buds near the base and roots. The roots are crucial in absorbing water within

the soil during droughts. The root buds are “critical for vegetative regeneration after a fire” (Coastal Sage Scrub, n.d.). Mediterranean climates support coastal sage scrub communities, characterized by hot, dry summers and mild, wet winters. This climate supports a diverse ecosystem, where species have evolved to withstand wildfires and developed strategies to minimize water loss. Furthermore, the soil microbiome of coastal sage scrub habitats is known to be more diverse than coastal sage plant communities, around twenty times more diverse.

Flora and Fauna

Coastal sage scrub ecosystems can provide services to the city of Santa Monica and the local wildlife. These environments are a biodiversity hotspot, carrying a variety of rare endemic species (Cleland et al., 2016). The natural beauty of coastal sage plants and the charismatic animals they attract can make the airport site a vibrant nature walk destination. The shrubs of coastal sage scrub habitats can also stabilize slopes, helping to shield urban areas from erosion, such as the homes immediately surrounding the Santa Monica Airport (Cleland et al., 2016).

To showcase the variety of plants that have existed in the region, we created a plant database that includes about 170 native plants, most of which support wildlife or have a common use by humans. Some examples of common uses found include bird gardens, pollinator gardens, bank stabilization, and groundcover. Of those plants, over 40 have Indigenous uses. Native plants used by Indigenous people are diverse and include food, medicine, basketry, and dyes. There are 99 plants recorded before 1930. Of these 99 plants, 37 grow in coastal sage scrub ecosystems. This result supports the “Mapping Los Angeles Landscape History: The Indigenous Landscape” report, which maps the past of the Santa Monica Airport site as coastal sage scrub. Our goal is to have our table used as a resource and inspiration for the future landscaping of the airport site, including native plants. We also hope that the space is used to educate visitors and residents about the uses and importance of plants native to the airport site.

Below are a few of the notable pollinator-friendly and native species from a catalog of all native and non-native species within a 10-mile radius of the Santa Monica Airport. Many of the plants in the catalog that were observed pre-development are characteristic of coastal sage scrub communities. Some of these plants serve as lifelines for wildlife, including birds, butterflies, and bees, while also contributing to ecosystem resilience through bank stabilization and ground cover.

Scientific Name	**Common Name**	**Plant Type**	**Water**	**Ease of care**	**Common Uses**
Salvia apiana	White Sage	Shrub	Low	Easy	Bank stabilization, groundcover, hedge Attracts birds, bees, butterflies
Ribes speciosum	Fuchsiaflower Gooseberry	Shrub	Low, moderate	Moderate	Deer resistant Attracts birds, hummingbirds, small mammals, butterflies, and moths
Salvia columbariae	Chia	Annual herb	Very low	Moderate	Attracts birds, hummingbirds, bees, caterpillars, and pollinators
Lasthenia glabrata coulteri	Coulter's goldfields	Annual herb	Moderate	Easy	Attracts butterflies, hosts caterpillars and pollinators
Stachys ajugoides	Ajuga Hedge Nettle	Perennial herb	Moderate	Easy	Attracts birds, hummingbirds, bees, caterpillars, and butterflies
Malvella leprosa	Alkali Mallow	Perennial herb	Low	Easy	Attracts butterflies, caterpillars, pollinators
Cyperus eragrostis	Tall Flatsedge	Grass	High	Moderate	Erosion control Attracts caterpillars and pollinators
Phalaris lemmoni	Lemmon's Canary Grass	Grass	Moderate	Moderate	Attracts caterpillars, butterflies and pollinators
Quercus lobata	Valley oak	Tree	Low, moderate	Easy	Wildfire resistant Attracts birds, small mammals
Quercus agrifolia	Coast live oak	Tree	Low	Easy	Attracts a wide variety of

					birds and butterflies
Eriogonum parvifolium	Seacliff buckwheat	Shrub	Low, moderate	Easy	Bank stabilization, groundcover Hosts endangered pollinating insects

The Santa Monica Airport was most likely a coastal sage scrub surrounded by a wet meadow and a large vernal pool. Coastal sage scrub is typical of a semi-arid Mediterranean climate with hot, dry summers and mild, wet winters. It is a rare biodiverse habitat, with only 10% of the original coastal sage scrub remaining in southern California. The diverse flora of coastal sage scrubs support a variety of different fauna. The nectar and pollen from scrubs and other flora attract pollinators and insects that attract other birds, lizards, and small mammals that feed on them. In turn, these fauna help spread coastal sage scrubs. With the reintroduction of native plants, these flora could potentially attract fauna to the area. Some common fauna found in Coastal Sage Scrub are reptiles, butterflies, and birds.

California quail (*Callipepla californica*) are indigenous to the west coast of North America to Baja California and are the state bird of California (Calkins et al., 2020). California quail are highly social. Aside from mating seasons, when they individually adopt their mating strategies, California quail spend most of the year in groups or conveys and have stable home ranges (Calkins et al., 2020). California quail even have spotters that give alarm calls to their covey when it detects danger (Calkins et al., 2020). California quail spend most of their time dust bathing and foraging for food; it primarily feeds on seeds, leaves, and fruit and rarely feeds on animals such as insects (Calkins et al., 2020).

Considering its permanent habitat range, California quail are not endangered, but due to habitat fragmentation, they are rarely spotted in urban areas and are considered a threatened species in Southern California (Calkins et al., 2020). For example, the last time a California quail was spotted in Baldwin Hills was in the 2000s (Baldwin Hills Nature, 2016). In the 1800s, California quail populations sharply declined due to agricultural practices destroying its habitat. In South California, there has been an upward and eastward population shift over the last 26 years, possibly due to temperature changes (Hargrove and Rotenberry, 2011). Furthermore, habitat fragmentations sampled over 20 years in San Diego depicted smaller, isolated fragments of California quail populations (Sartain and Alberts, 2008).

Western fence lizards (Sceloporus occidentalis) are commonly found in coastal sage scrubs, chaparral biome, or higher elevation areas (Schwenkmeyer, n.d.). Western fence lizards have spiny scales on their backs and limbs and can slightly camouflage their surroundings by darkening or lightening to fit the background (Schwenkmeyer, n.d.). They mate in the spring, around May or June. Their diet mostly consists of insects and arthropods. They have an affinity

to high places, which makes them more vulnerable to predators such as hawks (Schwenkmeyer, n.d.). They are not endangered and provide public health benefits as Western fence lizards' blood kills ticks infected with Lyme disease, reducing its spread to humans (Lane, R. S., et al. 2006)

California Gnatcatchers (*Polioptila californica*) are only found in southern California's sage scrubs, and in 1993, the Federal Government categorized California Gnatcatchers as a threatened species (Atwood and Bontrager, 2020). California Gnatcatchers are small, gray songbirds that rarely descend to the ground. It breeds in the late summer and fall and lays eggs from mid-March to early July (Mock, P. (2004). California Gnatcatchers mostly feed on small insects like spiders, beetles, and leafhoppers, and it also feeds on seeds, leaves, and flowers. California Gnatcatchers mostly forage in pairs or groups of up to five (Atwood and Bontrager, 2020). It has an affinity for California sagebrush and California buckwheat.

Urbanization is currently the largest contributor to habitat loss in the California Gnatcatcher, and the primary strategy for conservation is to have a network of habitat reserves (Mock, 2024). Although the California Gnatcatchers are mostly spotted in San Diego and other regions south of Los Angeles County, it is a species to potentially look out for if a coastal sage scrub is reintroduced to the area.

People

The Kizh (Tongva), known as the "people of the earth," served as the original caretakers and guardians of the vast land encompassing modern-day Los Angeles. Their ancestral territories stretched from the grand San Gabriel Mountains to the flowing waters of the Santa Ana River. Puvungna, a sacred site to many native people that is nestled in present-day Rancho Los Alamitos in Long Beach, marked the genesis of their rich cultural heritage. Kuruvungna, meaning "A Place where we are in the Sun," held profound spiritual significance for the Kizh (Tongva) people as it was the sacred springs they looked over.

The ecological history of Southern California is inseparable from the indigenous populations who actively shaped their environment using traditional techniques. Our findings about the Tongva people provide broad insights into how they lived which is entwined with the natural landscape. They were skilled people who utilized the abundant resources within the region, thriving in a harmonious relationship with the land. California shows "various stages of ecological succession, or fire sub climaxes, intensified and perpetuated by seasonally scheduled burning" (Anderson, 2005, p.156). Notably, staple foods including bluedicks and chia were cultivated and burned by indigenous peoples of Southern California (Anderson, 2005). This dynamic interaction with the land fostered a harmonious balance, preserving the region's natural splendor. Even though we did not find any large Indigenous settlements or historically significant cultural sites near the airport site in our research, Indigenous consultation is greatly advised for a more accurate analysis.

As land was stolen and violent colonization swept through California, Indigenous stewardship was disrupted. Spanish missions, followed by Mexican, and eventually American control, led to major changes in land ownership and usage. The general landscape, characterized by native flora and fauna, gave way to agricultural development and urbanization.

The establishment of the Santa Monica Airport is a symbol of this transformation. As it initially served as a private landing strip, the airport has since expanded during World War II, becoming a central site for military aircraft production and training. Our discovery of WWII records and files underscores its historical significance during this era, highlighting the airport's role in the war effort. Such media also includes graphics (Figure 3, Appendix E) and racist propaganda targeting Japanese and Japanese Americans (Figure 1, Appendix E). The range of wartime archival material represents how the airport served as a site of pride for the war effort (Figure 2, Appendix E) and a place with a stained past.

Discussion and Recommendations

While achieving complete restoration to the original state of SMO poses challenges due to stark changes in the landscape, the effort will significantly improve habitat conditions for wildlife and plants. Our research into hydrology and topography provides context into the dynamic and diverse natural processes and landforms that used to be here. While it may not be possible to bring back the ephemeral stream or rebuild the bluff, knowing this history allows us to envision a future that better honors the natural landscape that once was.

After assessing the plant community, specifically coastal sage, our team meticulously reviewed our *Herbarium Records Catalog*. Based on several criteria - such as adaptability to today's climate, attractiveness to birds and pollinators, low water requirements, and aesthetic appeal for the community - we recommend reintroducing the following top five plant species. These plants represent just a few of many options for species reintroduction. We encourage further research on species reintroduction to the site and exploration of other suitable options.

White Sage (*Salvia apiana*)
White sage once served as a food source, for spiritual, and medicinal use for the Native tribes in Southern California. It is a white shrub that provides benefits for the ecosystem such as bank stabilization, and groundcover for small animals, and provides sustenance for wildlife such as hummingbirds, small birds, bees, and butterflies. White sage thrives in a variety of soil types, bright sunshine, and requires a low amount of watering.

Ajuga Hedge Nettle (*Stachys ajugoide*s)
Ajuga Hedge Nettle is a vibrant flowering plant in the mint family and is native to western North America. They thrive in moist areas and leave an aromatic scent. The bright pink cluster of flowers attracts pollinators such as butterflies, and bees, and hosts caterpillars. Additionally,

hummingbirds and birds use ajuga hedge nettle as a food source. This herb plays an essential role in supporting local ecosystems and wildlife.

Chia (*Salvia columbariae*)
This plant was once a staple food source of the tribes in Southern California and provided medicinal use (USDA). Chia is an annual herb of the mint family that blooms in the spring. This plant species prefers sandy and clay soils. Chia is drought-tolerant and does not need to be watered frequently. When in bloom, it acts as an important source of nectar for pollinating insects while attracting birds and small mammals that feed on the seeds.

Coulter's Goldfields (*Lasthenia glabrata coulteri*)
In the blooming season, these bright yellow flowers provide a food source and shelter for pollinators, hummingbirds, and small birds. Coulter's Goldfields live in habitats that have heavy soils, vernal pools, and low alkaline fields. The flowers support pollinators and bloom every spring season.

Coast Live Oak (*Quercus agrifolia*)
The Coast Live Oak is an iconic tree that plays a vital role in its ecosystem. It thrives in coastal environments with frequent fog and mild wet winters. Coast Live Oak blooms each spring, attracting a wide variety of birds and butterflies. Additionally, the tree grows acorns that serve as food for wildlife. The deep roots of the tree prevent erosion and provide stability. The fallen leaves also turn into mulch that supports other plants.

Preservation of People's History

We found that in general, pre-WWII documentation of Santa Monica's ecological history is very limited. Given this, we believe consulting indigenous communities who originally stewarded the land such as the Kizh (Tongva) would be the best way to gain a more comprehensive understanding of the land's history. Moreover, consultation should be done in respectful partnership with such communities and consist of proper compensation for their time and knowledge. As we find it important to educate people about the area's original caretakers, consultation from Indigenous communities would be best. Their history being shown for educational purposes should also be led by, authored, and credited to them as well. We believe it best that feedback be gathered from the community and overall shaping their own narrative.

As discussed in the results section, our research led us to learn a lot about the extensive role that the airport played in WWII and its impact on the people in the region. While this history is not directly tied to the ecological history, recognizing the cultural and sociological impact of this airport is significant.

For this reason, we recommend integrating this background along with the ecological history into a historic learning center and educational signage throughout the site. Including education dedicated to the human experience and impact on the site over time would

acknowledge the experiences of the original Indigenous caretakers of the land, Japanese Americans, veterans, wartime workers, and others. Comprehensive storytelling at these sites could educate the public about the many different changes the land has undergone, fostering a deeper appreciation for learning from the past and preserving the site for future generations.

Deliverables

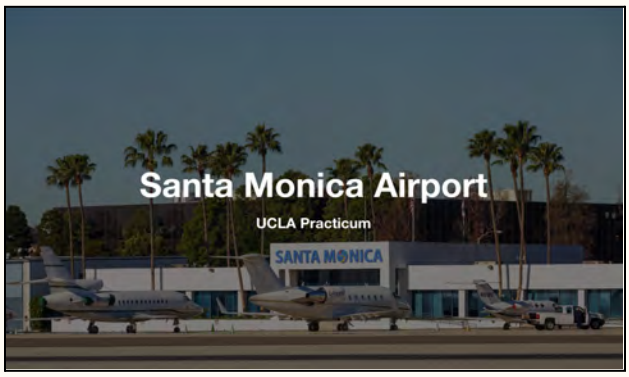
Deliverable 1: Presentations

The first phase of Presentation from a team tailored to consultants/city staff/stakeholders, etc.

City of Santa Monica Airport - W2024 Presentation

Presentation on the early stages of research and direction of the project. Focuses on methodology on data collection, and explains the overall background of the project.

City of Santa Monica Airport - S24 Mid-Quarter Presentation

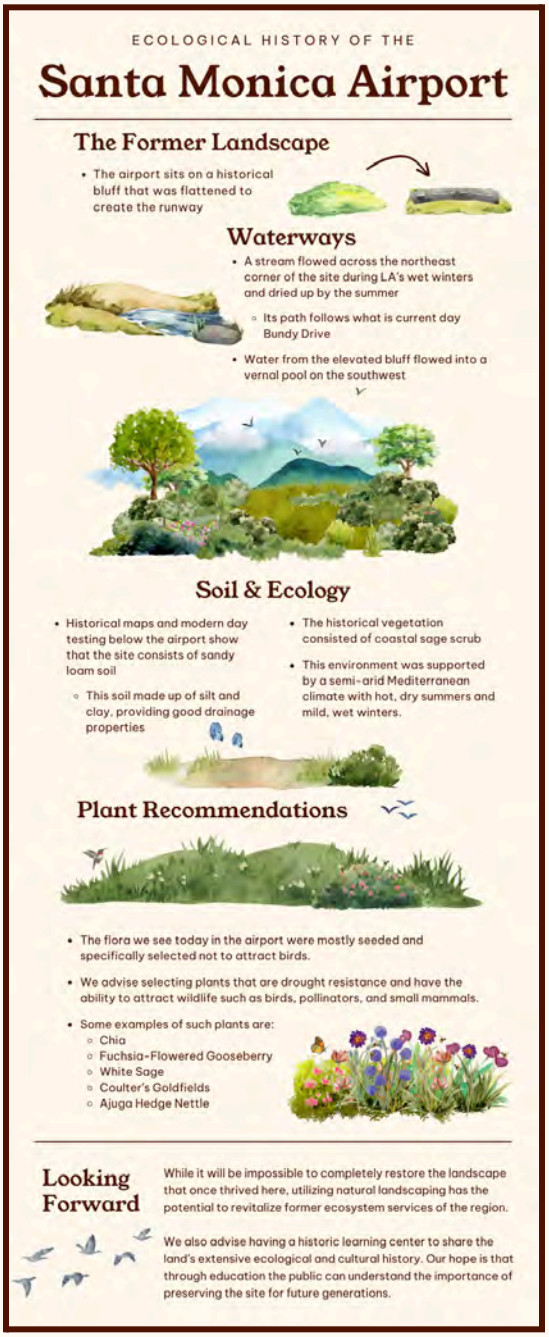


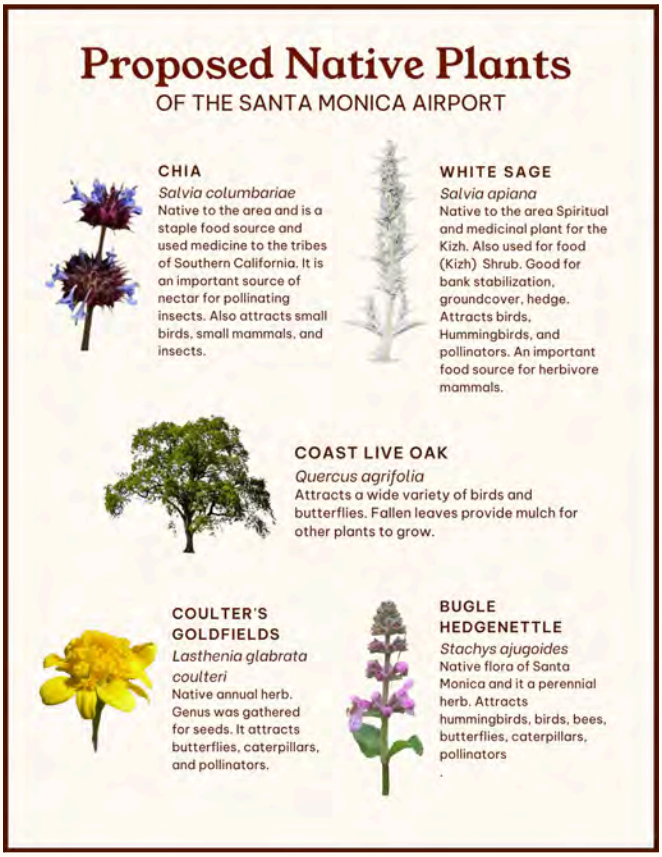
This is the final presentation of our deliverables, research process, findings, and results.

City of Santa Monica Airport - S24 Final Presentation

Deliverable 2: Infographics

These infographics are a synthesis of our main findings and proposed flora, presented in a way that is easily digestible.

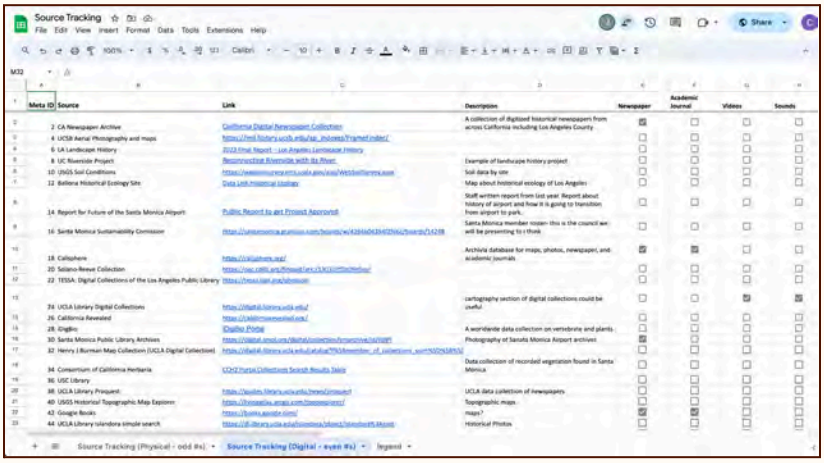




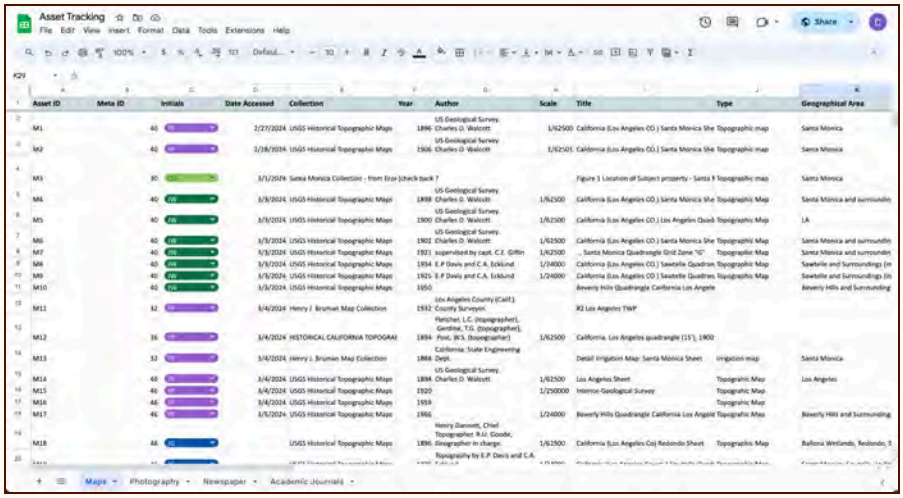
Deliverable 3: Comprehensive data archive and summary

The Source Tracking archive contains all the sources used to find assets in our research, including a link to their website, a description, and the types of data they specialize in if any. The sources have separate physical and digital sections. Our sources are listed with Meta IDs to help attribute assets we found to specific sources. The physical sources have odd-numbered Meta IDs and digital sources have even-numbered IDs. The Asset Tracking archive is split up into separate categories including maps, photography, and written records (such as newspaper articles, herbarium records, and scientific journals). Each section contains relevant credits, dates, links, descriptions, titles, and notes about use in the deliverables. Both datasets were given to clients as a resource bank for their future planning.

Source Tracking



Asset Tracking



Deliverable 4: Synthesis in an ArcGIS Story Map

As a part of our project deliverables, our team created an ArcGIS StoryMap, *Informing the Future of Santa Monica Airport*, to present important information in a visually compelling and accessible format for the public. ArcGIS Story Map is an interactive website that showcases our research and GIS mapping. It is a useful tool to create engaging and informative stories by synthesizing maps, narrative text, images, and other content. Our StoryMap compares historical maps with their contemporary counterparts, offering insights into the site's evolution over time. Additionally, the StoryMap delves into the complex ecology and land use patterns, providing an overall comprehensive understanding of the site's past and present.

Link to the Santa Monica Airport's Story Map:
https://storymaps.arcgis.com/stories/970ea7c48e7a47cd80725a41649550a9

Conclusion

The site of Santa Monica Airport holds a rich ecological and cultural history that extends beyond what meets the eye today. Through this research, we can better imagine what Santa Monica was like before colonization and early 20th-century development: atop a raised bluff surrounded by plentiful ephemeral streams amongst a fire-resilient coastal sage scrub community. By gaining a deeper understanding of the landscape where the great park is to be built, we can make more informed, research-driven decisions as to what the area should look like for generations to come. We must thoroughly understand the previous two hundred years to reimagine the next. Only with a fully informed foundation will this reimagining of the Santa Monica Airport have "the potential to be one of the most transformative urban planning events of this century for the City of Santa Monica" (City of Santa Monica Staff Report, 2023).

Appendix A

Scientific Name	Common Name	Year(s) Identified	Indigenous Use	Plant Type	Wildlife Supports/common uses	Soil	Ease of Care
Alnus rhombifolia	white alder	1954	bark used for dyes (Maidu). Young shoots used for fire-making kits. Wood used for tinder. Roots used for basketry. Used for arrows (Anderson)	Tree	Birds, butterflies, pollinators	Sand and clay	Easy
Amaranthus palmeri	carelessweed	2010		Annual Herb	Caterpillars, pollinators	Silty clay loam, Sandy loam	
Amaranthus powellii	Powell's amaranth	1905		Annual Herb	Caterpillars, pollinators	Loam, Sandy loam	
Ambrosia chamissonis	silver burr ragweed	1905		Perrenial Herb	Bank stabilization; Bees, caterpillars, pollinators	Beach Sand	
Ambrosia confertiflora	weakleaf bur ragweed	1942		Perennial Herb	Caterpillars, pollinators	Loam, Sandy loam, Loamy sand	
Ambrosia psilostachya	Cuman/Western ragweed	1941, 1959, 1966		Perennial Herb	Birds, butterflies, grasshoppers, pollinators	Adaptable	
Ambrosia psilostachya var. californica	Cuman ragweed	1966		Perennial Herb	Birds, butterflies, grasshoppers, pollinators	Adaptable	
Amsinckia	fiddleneck	1933	Leaves and stems used for food. (Kizh)				
Amsinckia intermedia	common fiddleneck	1933		Annual Herb	Butterflies and host plants	Various soils	Moderate
Antirrhinum nuttallianum subsp. nuttallianum	violet snapdragon	1902		Annual Herb	Hummingbirds, birds, bees, caterpillars, pollinators	Various soils	

Appendix B

Figure 1

Japanese Caricature Propaganda in Douglas Magazine

Notes: Tokio Kid Douglas Magazine: Douglas Airview

Figure 2

Suggestions for War effort in Douglas Magazine

Notes: Ideas for Uncle Sam Douglas Magazine: Douglas Airview

Figure 3

Comic Strip Propaganda in Douglas Magazine

EL SEGUNDO

by Clyde Kintz

Notes: Comic Strip depicting American Soldiers and Japanese in Douglas Magazine: Douglas Airview

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