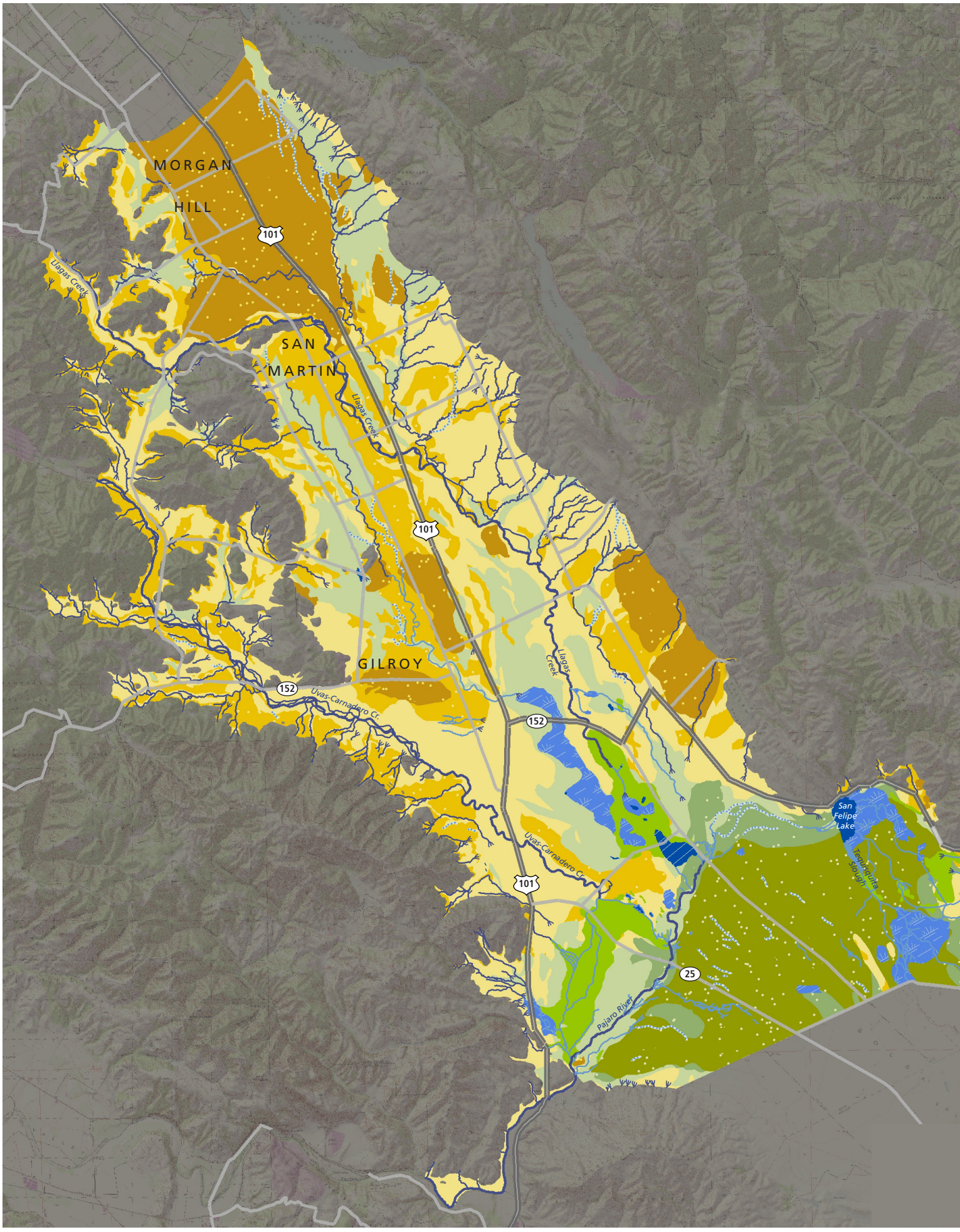
EXECUTIVE SUMMARY

SOUTH SANTA CLARA VALLEY HISTORICAL ECOLOGY STUDY

INCLUDING SOAP LAKE, THE UPPER PAJARO RIVER, AND LLAGAS, UVAS-CARNADERO, AND PACHECO CREEKS

SAN FRANCISCO ESTUARY INSTITUTE

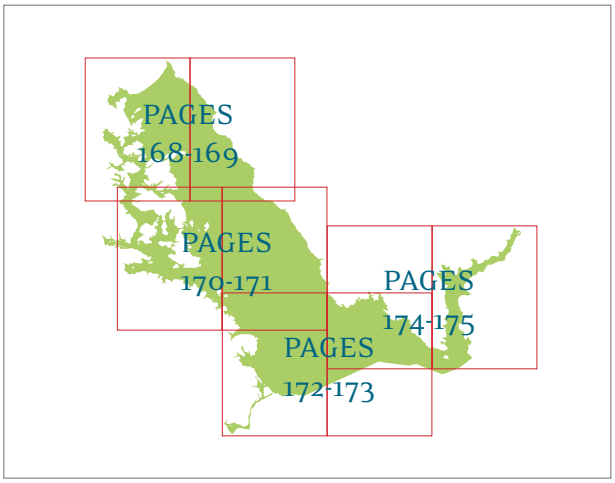
PREPARED FOR THE SANTA CLARA VALLEY WATER DISTRICT
AND THE NATURE CONSERVANCY
MAY 2008

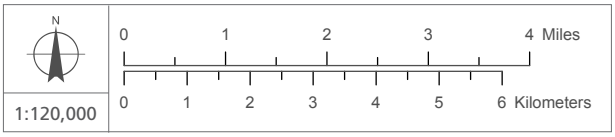

MORGAN HILL
SAN MARTIN
GILROY
101
152
25
Llagas Creek
Uvas-Carnadero Cr.
San Felipe Lake
Tequisquita Slough
Pajaro River

HISTORICAL CONDITIONS, CIRCA 1800

- Perennial Freshwater Pond
- Seasonal Lake/Pond
- Valley Freshwater Marsh
- Alkali Meadow (low concentration)
- Alkali Meadow (high concentration)
- Wet Meadow
- Willow Grove
- Oak Woodland
- Oak Savanna
- Grassland
- Mainstem Stream
- Tributary Creek or Side Channel
- Floodplain Slough
- Swale

The map at left reconstructs the habitat characteristics of south Santa Clara Valley prior to significant Euro-American modification. More detailed views are provided on pages 168 through 175 in the full report.





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SOUTH SANTA CLARA VALLEY HISTORICAL ECOLOGY STUDY

INCLUDING SOAP LAKE, THE UPPER PAJARO RIVER, AND LLAGAS, UVAS-CARNADERO, AND PACHECO CREEKS

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Grossinger, RM, EE Beller, MN Salomon, AA Whipple, RA Askevold, CJ Striplen, E Brewster, and RA Leidy, 2008. Executive Summary for South Santa Clara Valley Historical Ecology Study, including Soap Lake, the Upper Pajaro River, and Llagas, Uvas-Carnadero, and Pacheco Creeks. Prepared for the Santa Clara Valley Water District and The Nature Conservancy. A Report of SFEI's Historical Ecology Program, SFEI Publication #558, San Francisco Estuary Institute, Oakland, CA.

Front cover: Irrigation canal on Emery Ranch, Soap Lake, looking downstream, ca. 1900. Courtesy of the San Benito County Historical Society

Title page: Diseño showing Llagas and Carnadero creeks.
Courtesy of The Bancroft Library, UC Berkeley

EXECUTIVE SUMMARY

OVERVIEW

This report synthesizes an array of historical records to document historical conditions, landscape trends, and restoration opportunities in the southern part of the Santa Clara Valley. It has been developed at the request of the Santa Clara Valley Water District (SCVWD) and The Nature Conservancy (TNC) to inform strategies for natural flood protection, habitat conservation and restoration, and other environmental management challenges.

To develop the historical data set for this study, we reviewed thousands of historical records at local and regional archives. Several hundred of these contributed useful information to the study. Historical records were compiled into a geo-database and synthesized into a composite map describing landscape conditions prior to significant Euro-American modification. Data collection and analysis focused on the south Santa Clara Valley, from Morgan Hill south to Shore Road. This area includes the heavily modified alluvial channels, fans, and floodplains of Uvas-Carnadero, Llagas, and Pacheco creeks, the upper Pajaro River, and most of the Soap Lake floodplain. Approximately 80% of the study area is located in Santa Clara County; the southern portion of the study area extends across the Pajaro River (the county line) into San Benito County to include its floodplain. This area includes San Felipe Lake and its surrounding lowlands, often called the Bolsa.

The historical record for south Santa Clara Valley ("South Valley") represents a robust resource for understanding how contemporary conditions have evolved and identifying the potential strategies for environmental recovery. The map of historical habitats shows how the local landscape successfully supported native species in the relatively recent past and, in many cases, suggests the physical factors that control habitat formation and maintenance. In the context of information about present-day conditions and future projections, historical ecology can be used by scientists, policy makers, and local residents to design locally appropriate plans that are supported by persistent landscape processes.

FINDINGS

LANDSCAPE LEVEL

The native South Valley landscape supported a diverse array of habitats, from dense valley oak woodlands in the north to repeating wetland mosaics in the southern part of the study area. The valley was almost evenly divided between grassland, oak savanna/woodland, and wetlands (including seasonal and perennial wetlands).

Historical habitat distribution was heterogeneous and can be largely explained by identifiable physical characteristics. Factors such as topography, soils, and hydrology are still likely to affect restoration potential. Consideration of historical habitat controls should improve the likelihood of restoration success.

Some of the native habitats and species that have experienced greatest local decline – such as sycamore alluvial woodland, lesser nighthawk, and least Bell's vireo – are at the northern margin of their historical range. Given anticipated climate changes and associated shifts in species range, these may be of greater local conservation importance in the future.

STREAMS AND RIPARIAN HABITATS

Prior to Euro-American settlement, the South Valley drainage network was much more discontinuous and diffuse. Streams commonly did not maintain defined channels across the entire valley floor. Instead, they sank into their alluvial fans and recharged groundwater, or spread into wetlands. Many channels were relatively shallow and prone to flooding. Sloughs and swales were common.

The drainage network has been expanded to drain the valley floor. Over 40% of the contemporary channel network was artificially constructed using new alignments.

Most of the valley floor stream reaches were historically intermittent. Extensive historical evidence confirms that long reaches of Uvas-Carnadero, Llagas, and Pacheco creeks were seasonally dry across the valley floor.

Some intermittent reaches had persistent pools fed by subsurface flow. Pools were valued as fishing and swimming holes from native times through the early 20th century.

There were limited perennial stream reaches on the valley floor. Perennial flow on major creeks appears to have extended some distance downstream from the canyon mouth and, in some cases, reappeared where the lower reaches of streams intercepted groundwater.

The Pajaro River had unique ecological and hydrogeomorphic characteristics. Located in the historical artesian zone, the upper Pajaro River (San Benito River to Llagas Creek) had perennial flow and a dense, mixed riparian forest canopy, in contrast to other major South Valley streams.

Braided stream morphology was common on the major South Valley creeks. These broad reaches were interspersed with narrower, single thread reaches. Corresponding riparian habitat patterns were observed.

Open riparian savannas and woodlands dominated by California sycamore characterized the braided stream channels of South Valley. These high energy habitats included riparian scrub, occasional other riparian trees, and broad, unvegetated gravel beds and bars. Sycamore patterns varied from occasional, widely spaced trees along narrower channels to larger woodland groves on broad bars and terraces.

Riparian forest typically extended downstream from the canyon mouth on major South Valley creeks. The spatial transition from riparian forest to open riparian canopy was quite abrupt.

As a result of reservoir construction and operation, there has been a general conversion of open riparian canopy habitat to more densely wooded environments. The total length of forested reaches on the valley floor has more than doubled, while savanna and woodland reaches have decreased substantially.

Stream corridors have also consistently been constricted by land use changes. While riparian corridors wider than 60m (200 ft) were historically prevalent on the Uvas-Carnadero, Llagas, Pacheco, and Pajaro (70% of their valley floor length), now 70% of their length is narrower than 60 m (200 ft).

The lower reaches of Uvas-Carnadero, Llagas, and Pacheco creeks had substantial wetland reaches, where they spread into broad mosaics of willow groves and freshwater marsh. These areas provided an array of functions, including flood peak attenuation, fine sediment storage, and habitat for a diverse array of plants and wildlife, including a number of special status species.

While sycamore riparian habitat has been altered on most stream reaches, a significant remnant still exists on Pacheco Creek. This habitat is a regionally significant example of Central Coast Sycamore Alluvial Woodland.

Management considerations

Stream restoration could potentially reestablish natural stream benches and associated sycamore riparian habitat as part of natural flood protection efforts. For example, large remnant sycamore trees still remain along Llagas Creek, and could potentially be reconnected to the channel through restoration. Without specific efforts, this major element of the local natural heritage will probably disappear. Stream benches with scattered sycamores could also be re-created.

The Pacheco Creek sycamore alluvial woodland should be considered for its conservation value. Further research is needed to evaluate whether its long term health that would be improved through the use of scouring flood flows, carefully timed moistening flows for seedling recruitment, grazing management, and/or other stewardship actions.

Natural flow regimes have been altered on streams with large reservoirs. There may be further opportunities to adjust the timing and size of managed releases for ecological and geomorphic benefits. Higher flow pulse releases could potentially benefit natural stream maintenance processes, sycamore regeneration, and native fish populations. Well-timed late spring/early summer releases could potentially benefit both steelhead smolt outmigration and sycamore seedling establishment.

Different aquatic and riparian conditions may be appropriate targets for different stream reaches. Stream reaches can be evaluated in the context of the overall upper Pajaro River watershed by scientists, engineers, and water managers for appropriate, achievable reach-specific targets. Otherwise, stream habitat objectives may be in conflict. For example, summer water releases intended to benefit steelhead may have negative effects on remaining sycamore woodlands. Comparing historical conditions and existing potential may help identify viable strategies to balance competing resource objectives.

WETLAND HABITATS

Prior to Euro-American drainage efforts, wetlands occupied about 9,000 ha (22,000 ac) in South Valley. Most of these (83%) were seasonal wetlands, including wet meadows and alkali meadows. There were also 700 to 800 ha (1,700-2,000 ac) of perennial valley freshwater marsh and of willow groves.

Wetlands occurred in distinct landscape positions. Perennial freshwater ponds and marshes were always associated with fine-grained, clay-rich soils. Willow groves consistently occupied the margin between these poorly drained soils and adjacent coarser materials. Willow groves also followed groundwater discharge, associated with the outer margin of artesian conditions. Similar positions can be identified today.

Wetlands have experienced dramatic changes in total extent and other spatial characteristics. When compared with contemporary maps, historical sources indicate that the area of valley freshwater marsh has decreased by 90%. Willow riparian forest has decreased by a lesser amount (~60%), but the edge-to-area ratio of the remaining, more linear habitat patches has increased by over 700% compared to the historical habitats.

Alkali meadows dominated the Bolsa. These now rare habitats were extensive along the southern side of the Santa Clara-San Benito County line. Perennial marshes – both freshwater and saline – and ponds were scattered throughout the alkali meadows. Except for willow groves on the margins, trees were rare or absent.

Most of the wetlands in the study area were associated with the Soap Lake floodplain, a broad natural basin that historically supported a diverse and extensive array of wetlands.

Topographic position, poorly drained soils, persistent alkaline soil effects, and seasonal flooding continue to give the area relatively high potential for wetland restoration.

Some significant wetland remnants remain. San Felipe Lake retains some of its historical size and function (see below). Several of the smaller historical willow groves are still intact.

Small portions of historical wetlands have recently reestablished as groundwater levels have recovered and some areas have become less intensively managed. In particular, small willow groves and scattered individual willow trees can be seen within the extent of historical willow groves.

Mosaics of willow groves, freshwater marsh, perennial pond, and seasonal wetland provided an array of species support functions. Willow groves and freshwater marsh almost always co-occurred. Both habitats were always fully or partially bordered by seasonal wetlands. Perennial ponds were generally surrounded by freshwater marsh.

San Felipe Lake, an Audubon Important Bird Area, has decreased in size and depth, and the surrounding wetland mosaic has been reduced. This rare regional example of a natural perennial freshwater lake was a cultural and ecological centerpoint for hunting, fishing, and soap-making. While the lake retains 50-60% of its historical area, the freshwater marshlands bordering the lake have been almost completely eliminated (93%).

San Felipe Lake historically overflowed into a series of sloughs, swales, and wetlands that converged into the Pajaro River at the Llagas Creek confluence. This diffuse drainage system had no well-defined channel or riparian corridor but rather a chain of seasonal and perennial wetlands.

Management considerations

Historical wetland locations offer a number of sites that should be considered for conservation and stewardship. Significant remnants include San Felipe Lake and the nearby remnant willow groves. There is also significant potential for wetland restoration along Tequiquita Slough and lower Pacheco, Llagas, and Ulvas-Carnadero creeks.

The potential to restore wetland mosaics in the Soap Lake floodplain is regionally significant. A number of factors suggest that restoration is technically feasible. Restoration could potentially benefit numerous species, including an array of native songbirds, shorebirds and waterfowl, floodplain-associated fish, outmigrant juvenile steelhead, and amphibians.

Historical wetland mosaics present a template for wetland restoration design. Dynamic floodplain wetland mosaics – incorporating willow groves, freshwater marsh and pond, and wet/alkali meadows – are likely to be able to support multiple life history stages of numerous species within relatively small areas. Restoration strategies can recognize existing topographic, edaphic, and hydrologic gradients to reestablish these kinds of patterns.

OAK SAVANNA AND WOODLAND

Valley oak savannas and woodlands occupied much of southern Santa Clara Valley outside of the Soap Lake floodplain. These oak lands covered an estimated 9,000 ha (22,000 ac) and have declined by 98%. We estimate that there were 60,000 oak trees, of which about 1,000 remain.

Oaks occurred on the valley floor in a range of densities. Relatively open savanna with scattered trees was most common (5,700 ha/14,000 ac), corresponding to an average stand density of about three trees/ha and an estimated canopy cover of 12%. There were also much denser valley oak woodlands. We identified an estimated 3,300 ha (8,000 ac) of woodland, with an average of 13 trees/ha, and an estimated canopy cover of approximately 50%.

Valley oaks dominated the oak lands of South Valley. 84% of the oaks recorded to species level by mid 19th-century General Land Office surveyors were valley oaks. Black oak and live oak were minor components overall, but there are indications that they could be more dominant in certain places.

Valley oaks declined dramatically during late 19th century conversion of woodlands to orchards. While the presence of large oak trees conflicted directly with the development of densely planted orchards, the trees have posed less direct conflict with other local land uses, including grazing, hay and grain farming, and even residential development, where they have been valued for shade and aesthetic value.

There are just a few remaining historical oak groves. These provide the last remaining local examples of the habitat.

Management considerations

While the extent of valley oak lands has declined precipitously, there are many trees and a few groves that have been preserved to date. In addition to stewardship of remaining individual trees, these significant remnant groves may be worthy of conservation attention.

The historical spatial patterns of valley oak in South Valley suggest that reintegration of oak habitat within the contemporary landscape is possible. Within the context of an urban forestry plan, valley oaks could be strategically reintroduced (in medians, parks, yards, and along road and fence lines) to achieve densities similar to historical conditions.

Increasing the density of oaks may be important to allow successful oak reproduction and maintain a healthy population. Existing trees may be genetically isolated and thus have less ability to successfully adapt to changing conditions.

Valley oak restoration could benefit a number of native species whose ranges have been declining in South Valley, such as acorn woodpecker and Pacific pallid bat. Certain oak-associated species are largely precluded from the valley by the lack of oak trees.

Valley oak restoration can have a number of practical and aesthetic benefits. As shade trees, they are recognized for being attractive, deciduous, relatively fast-growing, and drought tolerant.