7 LOCAL LANDSCAPE DESCRIPTIONS

Above. Diseño showing willows and marsh along Pacheco Creek and San Felipe Lake. *Below.* A Valley oaks occupies alluvial deposits, slightly above the broad, flat, low basins (historically alkali meadow). Willow groves at the clay soil margin may be seen in the background.

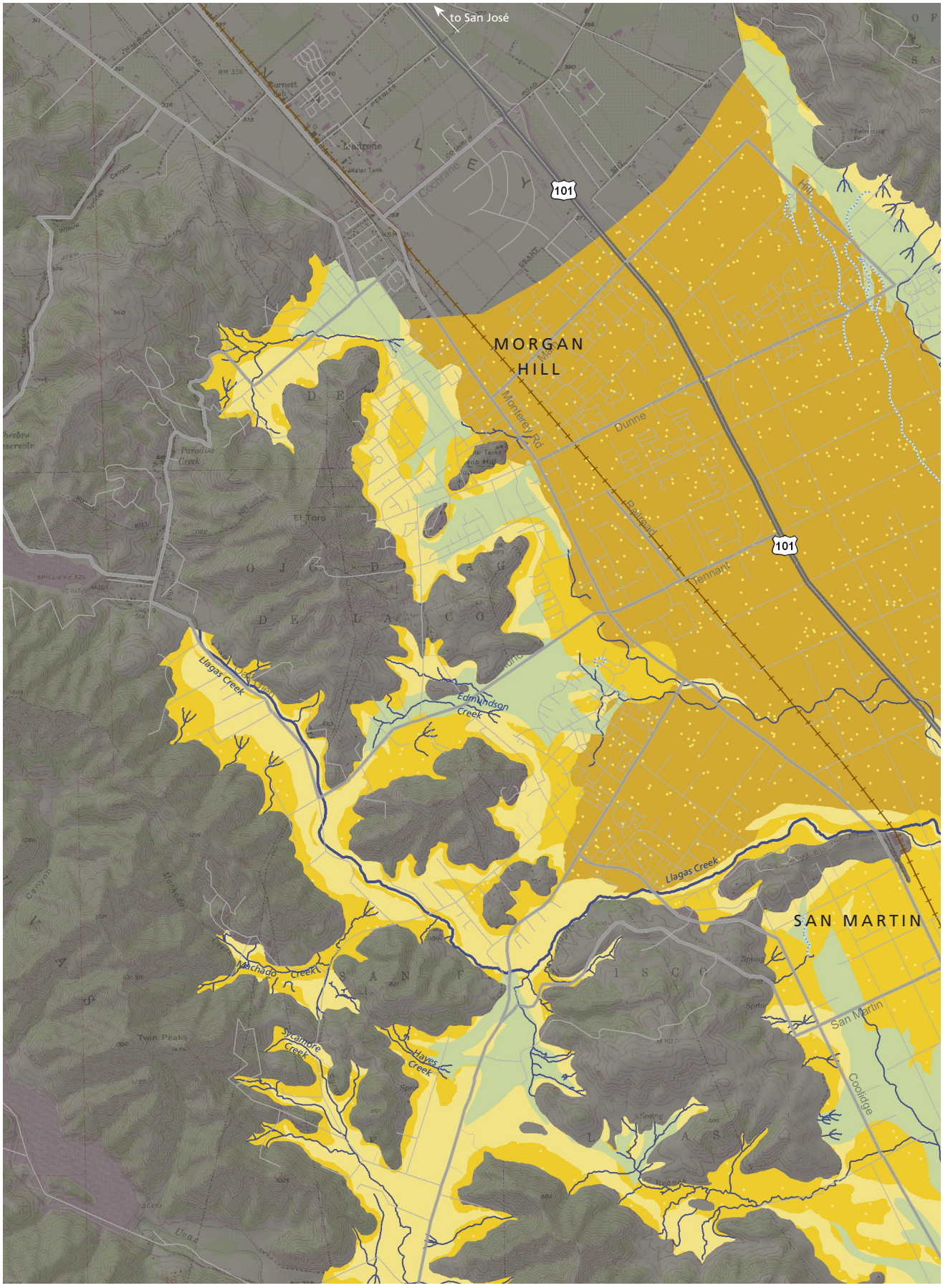
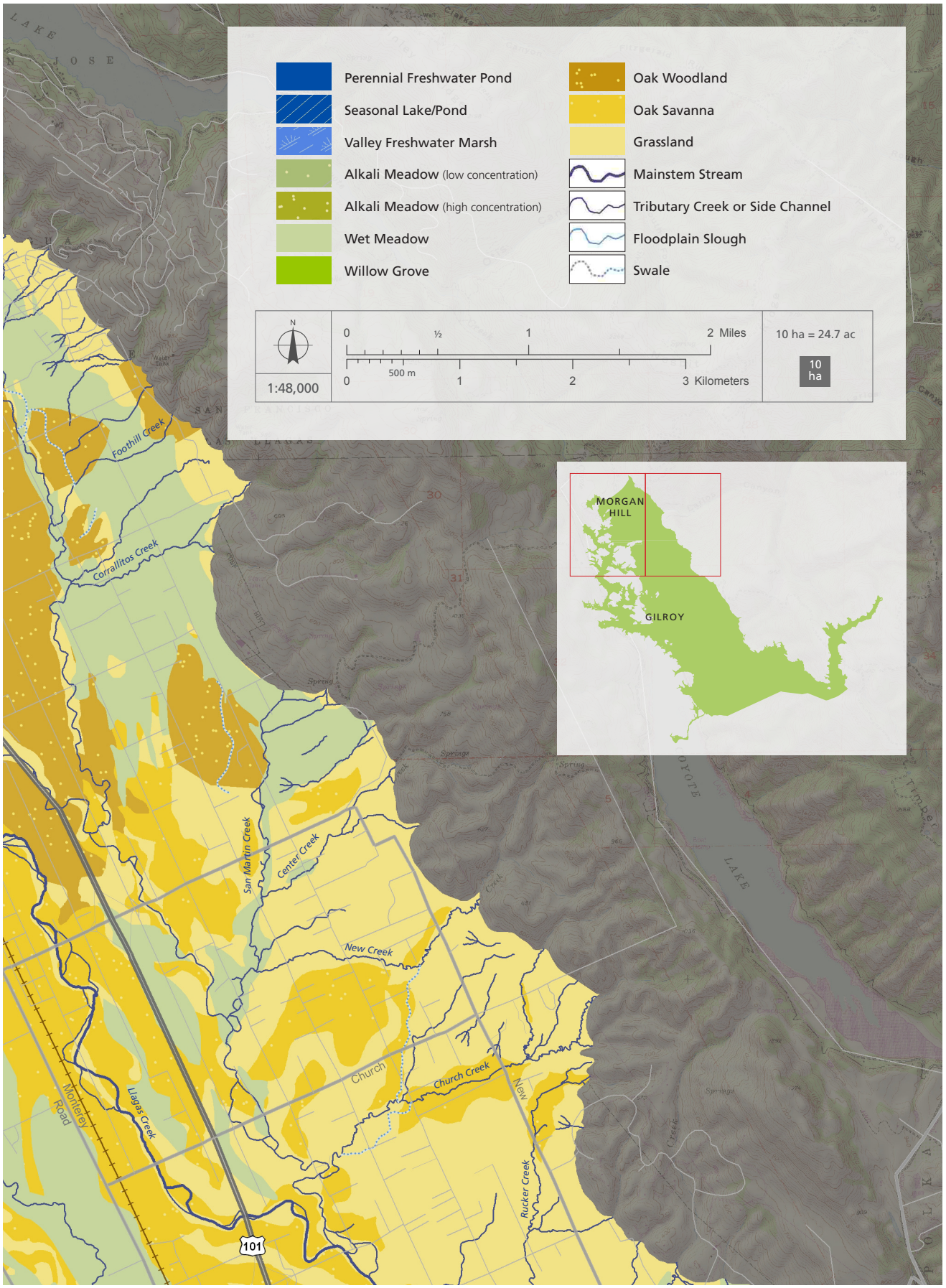


Figure 7.1. Reconstructed land cover map of south Santa Clara Valley prior to significant Euro-American modification (Morgan Hill area).


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
N
1:48,000
0 ½ 1 2 Miles
0 500 m 1 2 3 Kilometers
10 ha = 24.7 ac
10 ha
MORGAN HILL
GILROY
Foothill Creek
Corralitos Creek
San Martin Creek
Center Creek
New Creek
Church
Church Creek
Rucker Creek
Llagas Creek
Monterey Road
101

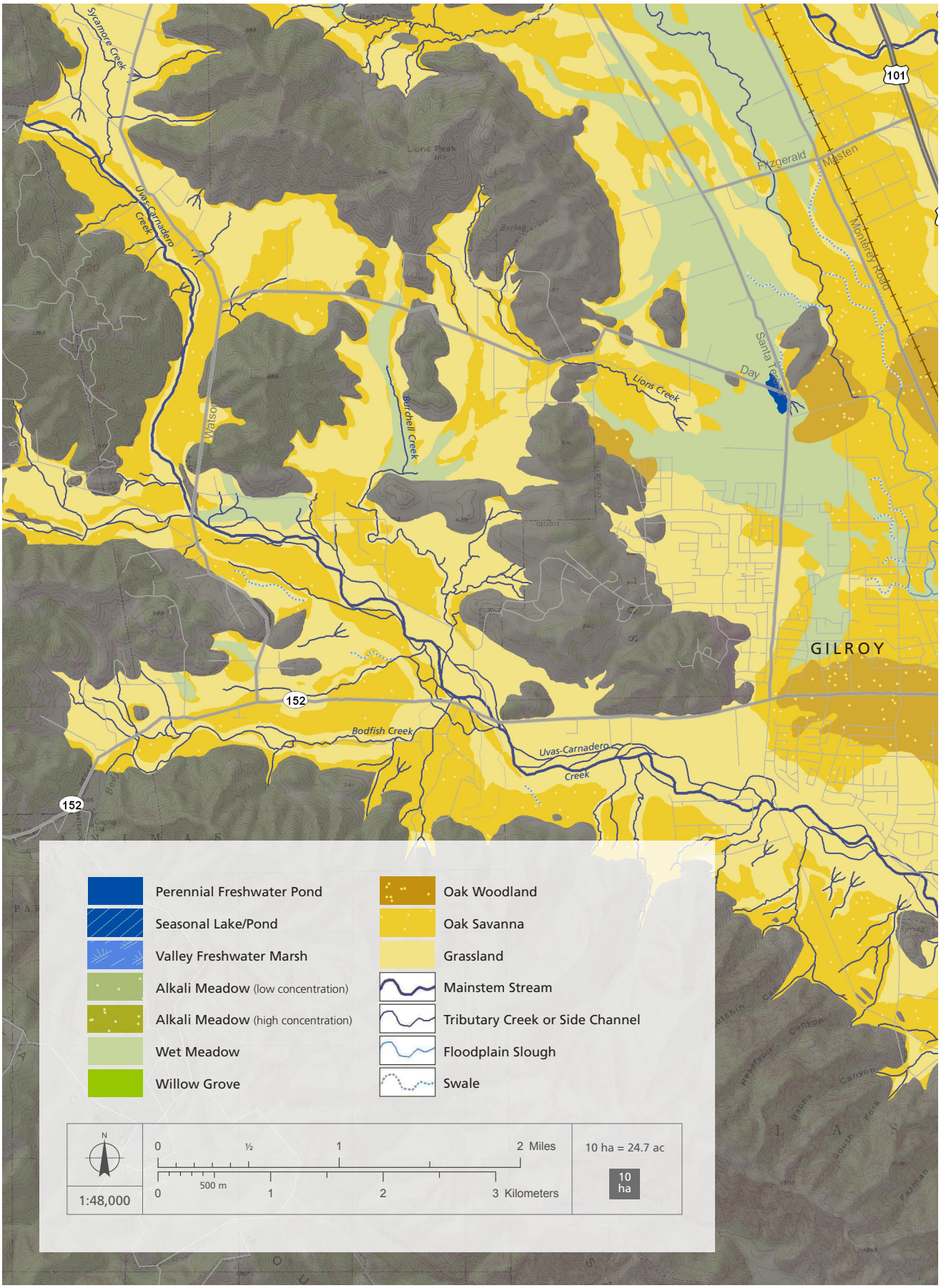
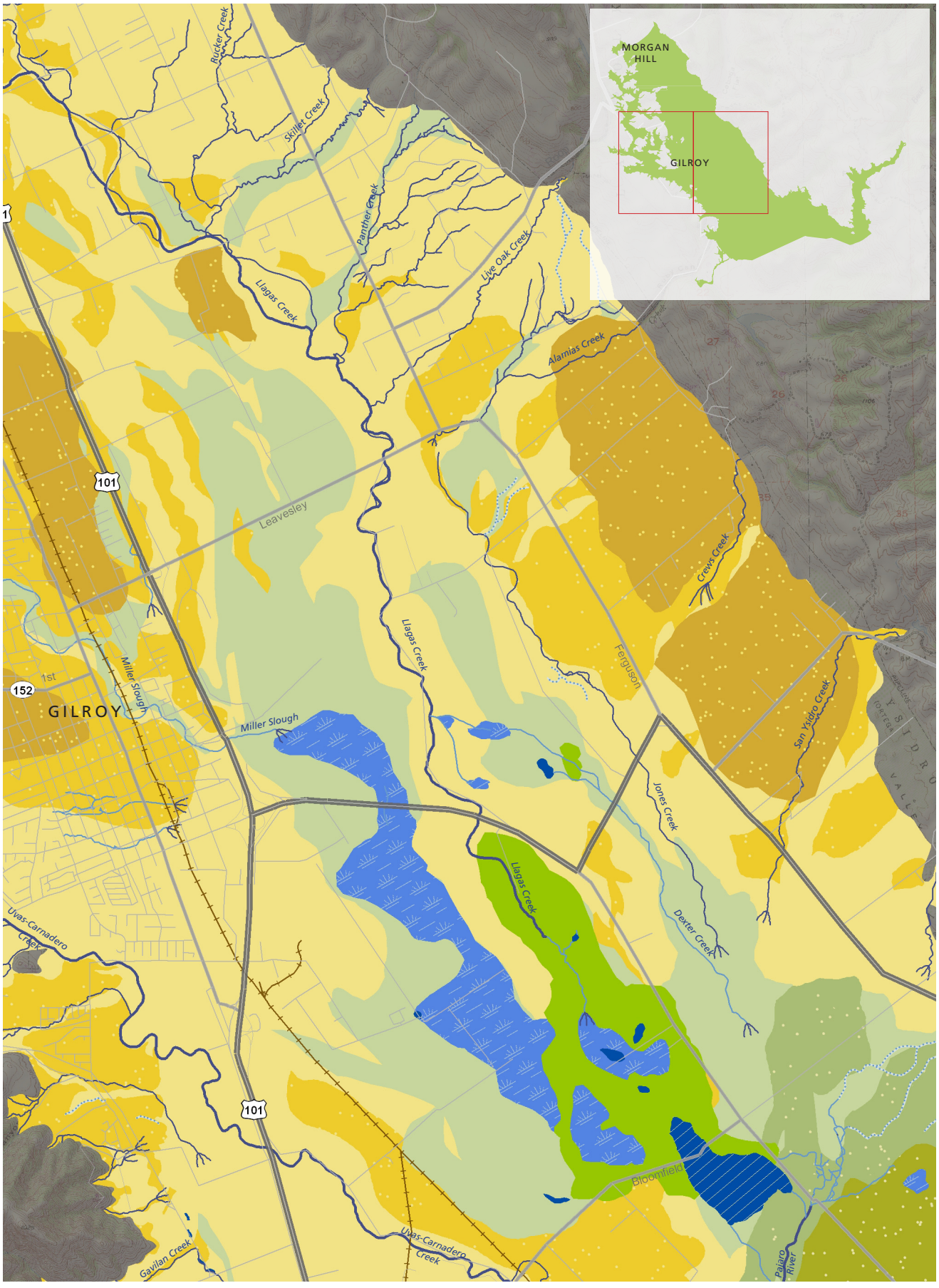


Figure 7.2. Reconstructed land cover map of south Santa Clara Valley prior to significant Euro-American modification (Gilroy area).


MORGAN HILL
GILROY
Rucker Creek
Skillet Creek
Panther Creek
Lone Oak Creek
Llagas Creek
Alamias Creek
101
Leavesley
Crews Creek
Ferguson
San Ysidro Creek
1st
152
GILROY
Miller Slough
Jones Creek
Dexter Creek
Uvas-Carnadero Creek
Bloomfield
Gavilan Creek
Pajaro River

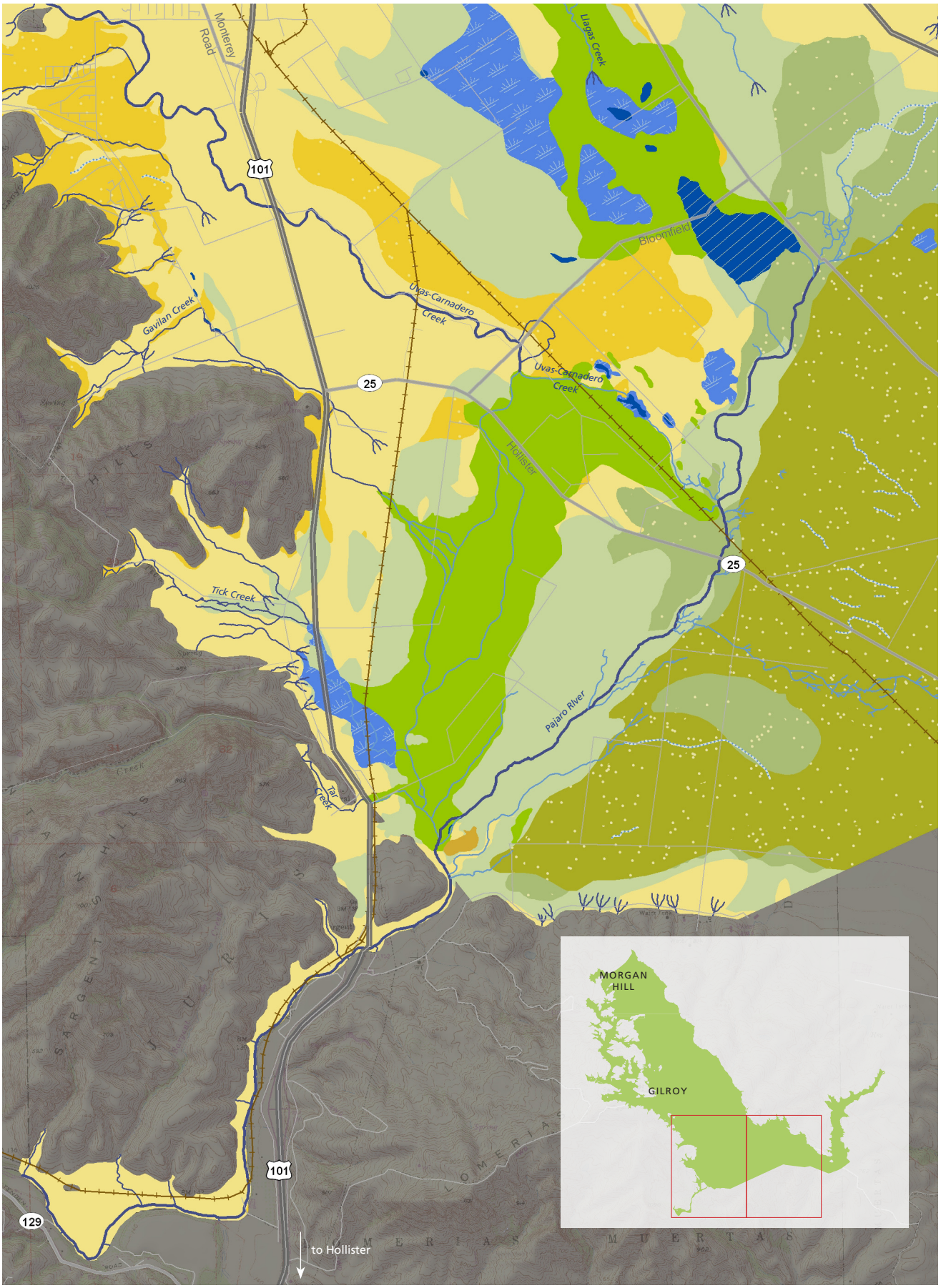
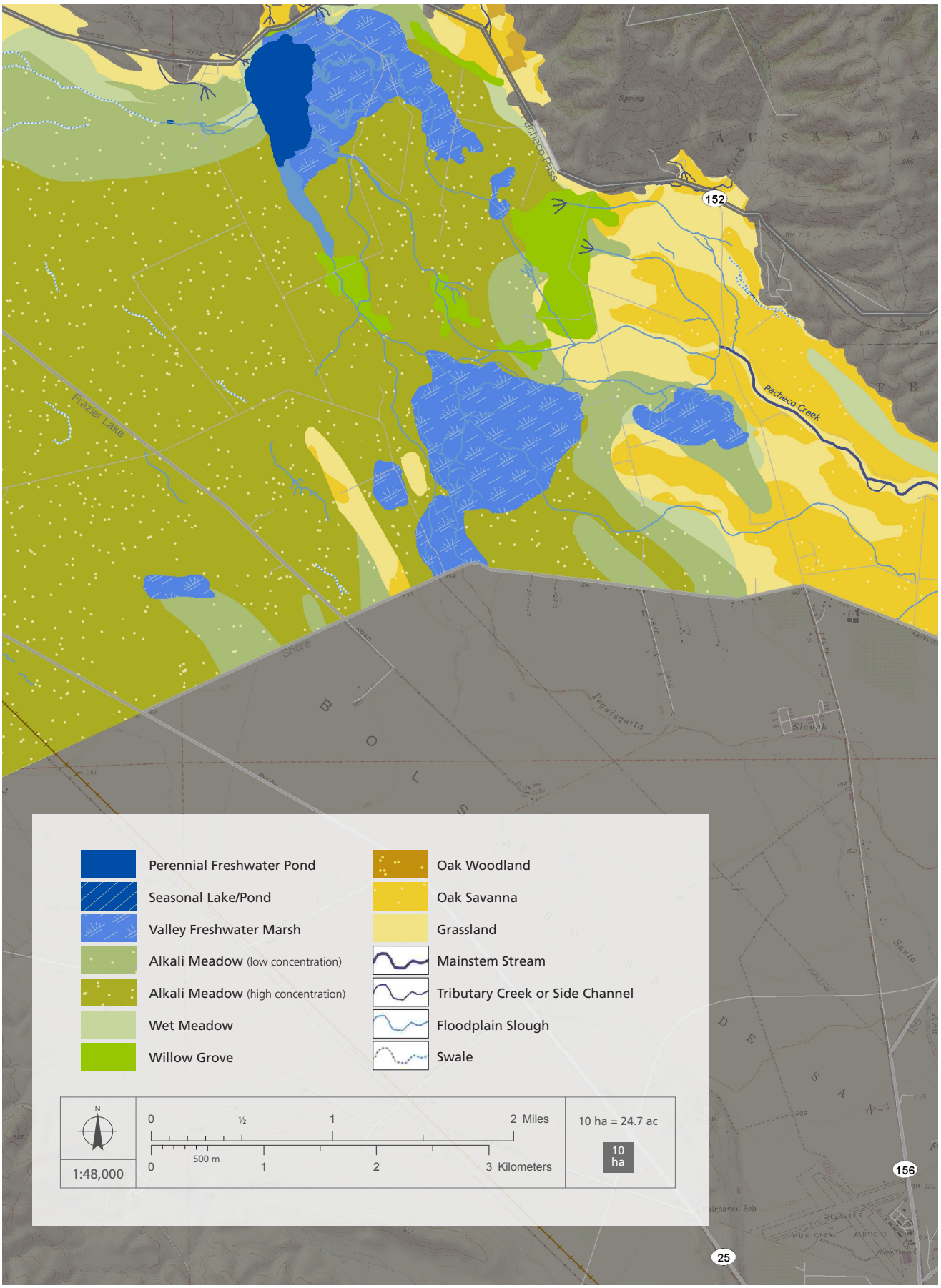


Figure 7.3. Reconstructed land cover map of south Santa Clara Valley prior to significant Euro-American modification (Soap Lake floodplain area).


Pacheco Pass
Pacheco Creek
Frazier Lake
Shore
Tequisquita
Slough
152
156
25
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
N
1:48,000
0
½
1
2 Miles
0
500 m
1
2
3 Kilometers
10 ha = 24.7 ac
10 ha

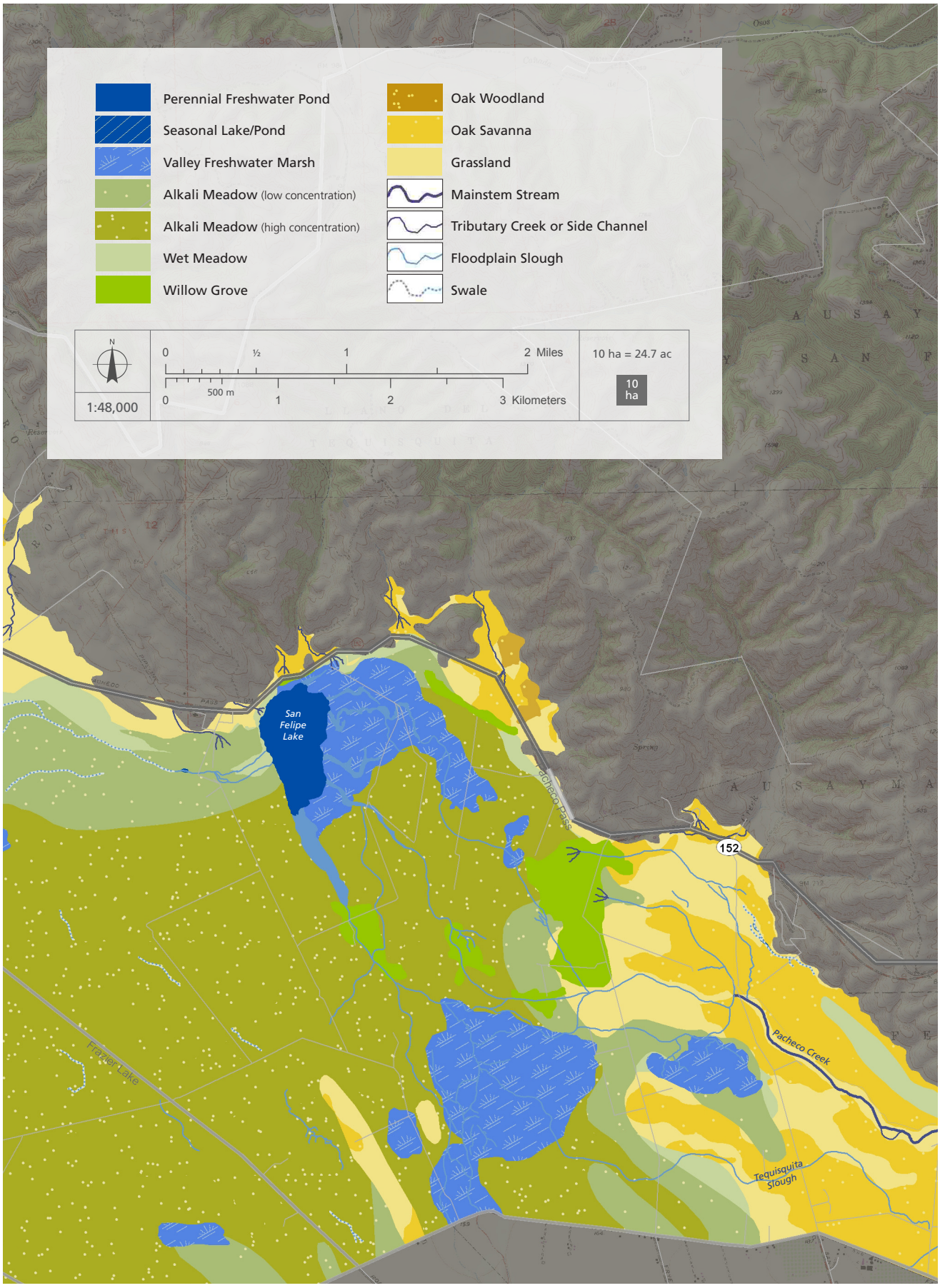
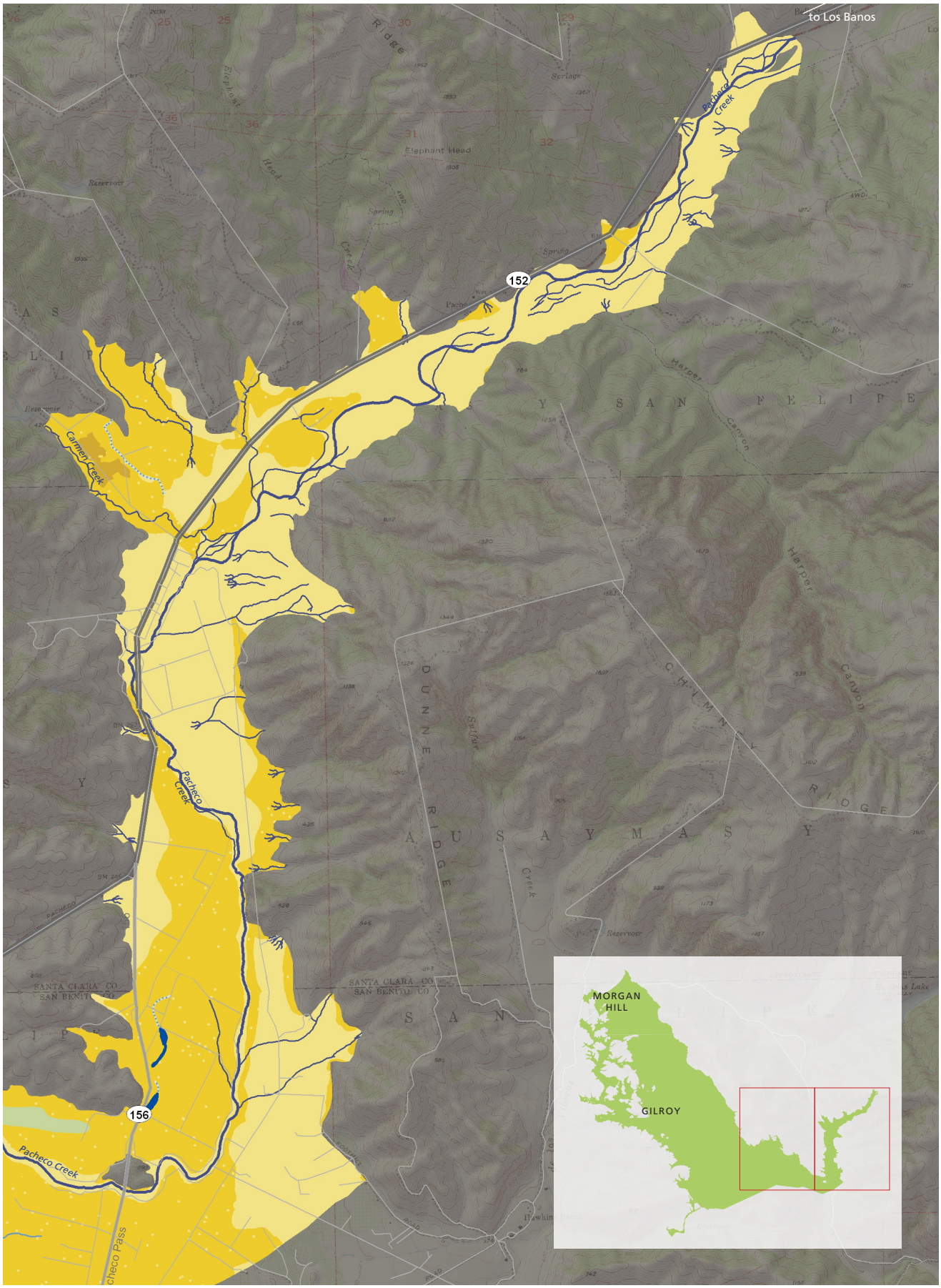


Figure 7.4. Reconstructed land cover map of south Santa Clara Valley prior to significant Euro-American modification (Pacheco Creek area).


to Los Banos
Pacheco Creek
Elephant Head
152
Harper Canyon
Carmen Creek
Pacheco Creek
DUNNE RIDGE
CHIMNEY RIDGE
SANTA CLARA CO
SAN BENITO CO
156
Pacheco Creek
MORGAN HILL
GILROY

LOCAL LANDSCAPE DESCRIPTIONS

This chapter provides additional historical evidence for and discussion of specific locales in south Santa Clara Valley. We first describe the overall landscape patterns of the South Valley, then each subregion of the study area. Level of detail varies somewhat by subregion, depending upon available information. Historical landscape patterns are shown in the full region map (inside front cover) and, at greater scale, in the preceding map series (figs. 7.1-7.4).

SOUTH SANTA CLARA VALLEY OVERVIEW

From the oak woodlands of Morgan Hill to the alkali meadows of the Bolsa, south Santa Clara Valley historically comprised a diverse array of habitats that have been integral to the ecology and culture of the region. This chapter expands upon the previous analysis to provide descriptions of what South Valley's local landscapes looked like before major Euro-American modification. We provide an overview of each stream and surrounding area, and highlight particularly notable historical features.

Many of these features were widely recognized and used (and often named) elements of the historical landscape. Perennial pools, such as the Poza de las Llagas, were valued for providing water supply to cattle, travelers, and area residents. Soap Lake was so called because ingredients for soapmaking were deposited near the lake through the seasonal evaporation of floodwaters. The oak groves near Morgan Hill provided an ideal, shady site for the town. Willow groves near Old Gilroy were a place for "camp-meetings" (Mylar [1929]1985), while residents fished, swam, picnicked, and were even baptized at the pool and island at the confluence of the Pajaro and San Benito rivers. Understanding the extent and history of these features offers us insight into not just the historical habitats of South Valley, but also the way former inhabitants of the area interacted with their landscape.

Landscape patterns shown by the historical reconstruction follow fundamental topographic, edaphic, and hydrologic controls. Varying patterns of grassland, oak savanna, and oak woodland reflect well-drained, slightly elevated alluvial fans and terraces. With lower groundwater levels relative to the soil surface, these soils stayed relatively dry in the winter, both preventing drowning and allowing for deep rooting depths (Lindsey 1974). In the summer months, the oaks' deep tap-roots could reach the water table and sustain the trees despite xeric ground surface conditions. The soil fertility and drainage characteristics of the alluvial fans that produced oak savanna and woodland also made them "splendid fruit land" (Harrison ca. 1888), and led them to largely be converted to orchards in the late 19th century.

> *"The country around Gilroy was green and wild oats were heading out and in bloom, and the wild flowers were blooming it was one of the most magnificent looking valleys that I had ever seen in California."*
>
> — JAMES EASTIN, APRIL 1850

The alluvial fans and levees created by Uvas-Carnadero, Llagas, and Pacheco creeks – and, in geologic history, Coyote Creek – dissipated into the Bolsa, spreading flood waters and fine sediments over a broad, unusually flat lowland area (Crespí described the area in 1772 as "smooth as the palm of the hand"; Crespí and Bolton 1927). Repeated evaporation of seasonal ponds left high salt concentrations in the soils of the Bolsa. These expansive, moist alkali soils were of limited agricultural value but important to the

growth of Hollister's cattle industry, providing late-summer pasture when the hills were dry.

The difference between the well-drained alluvial lands and the low-lying Bolsa was striking. Broek (1932) wrote: "Nowhere in the entire Santa Clara Valley is there a more decided contrast than between the bare Bolsa plain and the densely settled, highly cultivated districts of Gilroy to the north and Hollister to the south." Except for several large, dense groves of willows, the Soap Lake floodplain supported few trees. Valley oaks, a dominant feature in other parts of the alluvial plain, were almost completely excluded by the clay soils (fig. 7.5).

As Uvas-Carnadero, Llagas, and Pacheco creeks left their steeper alluvial fans and converged into the Soap Lake floodplain, they tended to have much less well-defined channels than today, spreading (often with multiple channels) into wetland mosaics. The willow groves and marshes at the mouth of each of these three major streams were essentially deltas on the margin of the vast, seasonal Soap Lake.

Flooding could cover much of this area, forming a "great bottom-land lake" (Stimson 1944). Even into the 1940s, shallow arrays of swales and channels formed the drainage system for the lower Llagas and Carnadero area: "In the Carnadero-Llagas Creek and San Felipe Lake region, overbank flow follows low swales and depressions between the normal stream channels, merging into a large floodplain extending from the vicinity of Gilroy to San Felipe Lake and Sargent" (USACE 1942). Water spread into an array of wet meadows, freshwater marshes and ponds, willow swamps, and swales, eventually coalescing again into a well-defined channel – the origin of the Pajaro River.

The riparian and aquatic habitats of south Santa Clara Valley exhibited a related range of ecological and hydrogeomorphic variation. Streams entering the valley rapidly sank into the permeable soils of their alluvial fans, creating a network of winter wet/summer dry reaches throughout most of the valley floor. Riparian habitat varied along a corresponding gradient from canyon to canyon mouth to the open alluvial plain (fig. 7.6). On smaller streams, a narrow line of trees at the top of the alluvial fan rapidly gave way to occasional trees or no riparian trees. Larger streams rapidly shifted from forest to woodland to open, sycamore-dominated riparian savannas as they reached the valley floor. Subsurface flows supported these sycamore savannas. The extent of persistent summertime fish pools is not known, but it is clear that they were common in at least some areas and supported substantial native fish resources.

On the open valley floor, sediment-rich, high-energy streams such as Uvas-Carnadero, Llagas, and Pacheco created heavily scoured, braided morphology with multiple, frequently shifting channels. Large, mostly unvegetated channel beds and bars with occasional riparian scrub, trees, or groves formed the characteristic riparian habitat. Uvas-Carnadero and Pacheco creeks, perhaps because of their steeper gradient, formed especially wide braided channel reaches. In contrast, Llagas Creek maintained a narrower braided channel along its lengthy alluvial course (still generally wider than 60 m/200 ft). Having deposited much of their sediment load but still with sufficient stream power to maintain a channel, Uvas-Carnadero and Pacheco creeks each underwent an abrupt shift from broad, braided channel to meandering single thread channel on the lower alluvial plain.

Tributary channels were often shallow across the valley (as little as a foot or two deep) and many dissipated completely, spreading into overland flow and groundwater percolation.

Groundwater reemerged at the base of the Uvas-Carnadero, Llagas, and Pacheco creek fans, as the streams ceased building natural levees and spread their remaining fine sediment into broad willow groves and freshwater marshes. Lower Pacheco Creek merged into the sag pond of San Felipe Lake, but (other than the large component of open water) the surrounding wetland mosaic was equivalent to wetlands at the base of Llagas and Carnadero creeks.

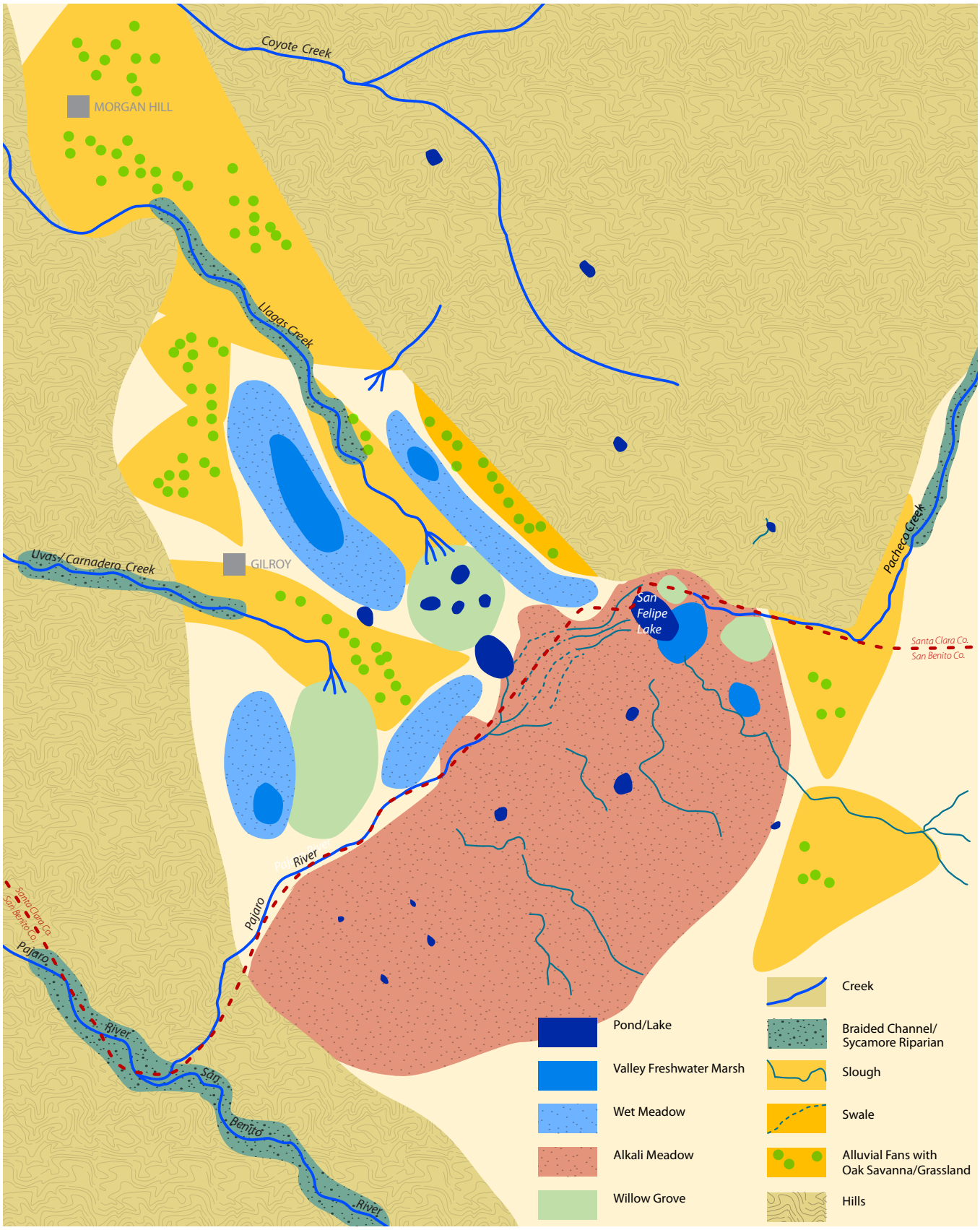


Figure 7.5. Conceptual model of landscape-level habitat patterns in south Santa Clara and north San Benito counties prior to significant Euro-American modification (simplified and not to scale).

Figure 7.6. A photograph titled "Fishing on Llagas Creek," illustrates a dense riparian canopy with alders in a rocky stream bed on upper Llagas Creek. (Unknown ca. 1896d, courtesy of History San José)

Substantial effort went into creating artificial channels through these wetland areas, including lower Carnadero and lower Llagas creeks (Stimson 1944):

> The land was at that time covered with a dense growth of willows. Mr. Rea cleared the land and opened a channel for Carnadero Creek... (Shortridge [1896]1986)

> In spite of a drainage ditch more than a mile in length which was constructed recently, the water table in this vicinity is usually within 3 feet of the surface during the drier part of the year, and during the rainy season the surface is inundated in places to a depth of 6 feet. Sedges and water loving plants are the main vegetation... (Cosby and Watson 1927a, describing lower Llagas Creek)

Downstream of these natural sediment sinks, a completely different style of stream formed – the densely wooded, meandering, perennial Pajaro River. The Pajaro River received perennial base flow as groundwater that percolated through the braided channels and alluvial fans of its tributaries and reemerged through the wetlands surrounding the Bolsa. The wetlands acted as sponges, releasing water to the river through the dry season, and maintaining perennial flow likely as far downstream as the San Benito River confluence, at which point its form became dominated by the large, braided river morphology of the San Benito.

MORGAN HILL, SAN MARTIN, AND MID-LLAGAS CREEK

The valley lands from Morgan Hill to San Martin (fig. 7.1) are shaped by the giant cone of Coyote Creek's alluvial sediment, which radiates outward from the creek's canyon mouth near Anderson Dam. The southern half of Coyote's alluvial fan extends southward, a remnant of when the creek flowed south to the Pajaro River

(Branner 1907). The well-drained Arbuckle gravelly loams, Pleasanton loams, and Pleasanton gravelly loams east of Morgan Hill supported dense oak woodlands.

Morgan Hill oak woodlands

> *"Morgan Hill . . . is situated in a beautiful grove of oaks"*
>
> — SHORTRIDGE 1896

GLO surveyor Richard Howe (1851) described this area as a woodland, containing "low, mossy oak timber," and landscape photography also shows closely spaced valley oaks (figs. 7.7 and 7.8; see Chapter 6). Progressing south toward the finer soils of the valley floor and higher groundwater tables, overall oak density decreased, making smaller woodland patches notable features within the larger grassland landscape. Unlike other fertile areas in the Santa Clara Valley, the land between Morgan Hill and Gilroy was subdivided fairly late (1892-3; Shortridge [1896]1986). Harrison (ca. 1888) reported:

> ... on the eastern side of the valley, is a large area of virgin soil, beautiful level valley land, covered with wide-reaching oaks, ably fine vine land, and is the least populous of all the Gilroy section of country. There are 40,000 acres of land here upon which there are less than a dozen residences.

As a result, large areas of the original oak woodlands still remained when landscape photography became more common in the 1890s, as film replaced fragile glass plates.

Figure 7.7. The 1896 view looking north along Monterey Road on July 25 shows some of the oaks remaining at that time (A). While few can be seen in the image from the same vantage point today (B), several large old trees are still found in Morgan Hill and younger live oaks can be seen in median strips along Monterey Road. Knob Hill, the vantage point for several of the Morgan Hill landscape photographs in Chapter 7, is on the left, behind the church which can be seen in both photos (a). (A: Unknown 1896, courtesy of the Morgan Hill Historical Society)

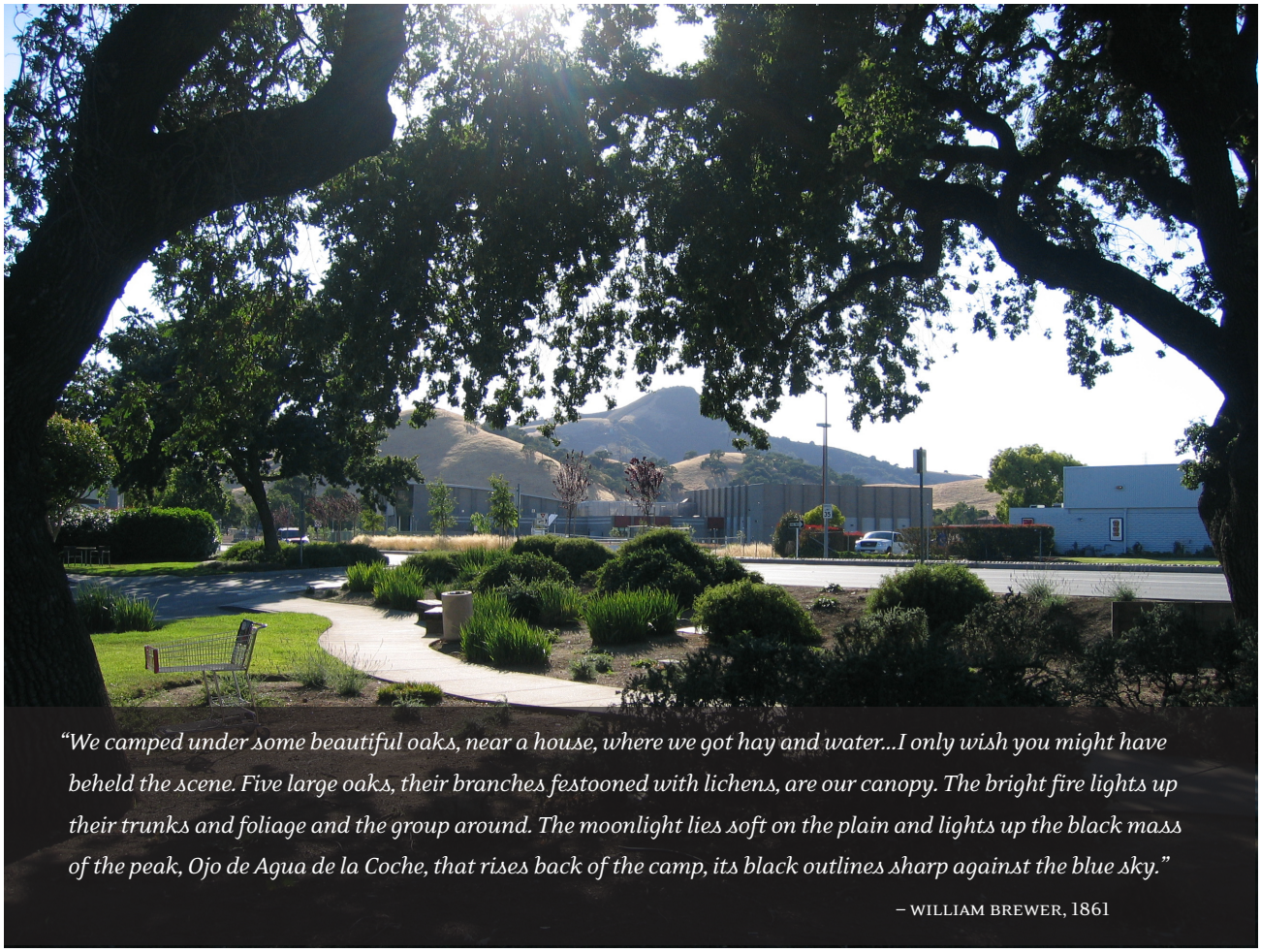


Figure 7.8. The 21-mile house, located at the corner of Monterey Road and Tennant Avenue, served as a stopping place since it was built in 1852 for travelers going between San José and Monterey (it was so-named because it was 21 miles from one town to the other). Many travelers recorded spending a night or two in the location, under the large oak trees shading the spot. In particular, renowned geologist William Brewer described the scene (transcribed above). The house was removed in 1917.

Wet meadows east of Llagas Creek

In contrast, a large zone of Cropley clay soils on the eastern extreme of the valley floor (and smaller pockets of other wetland-associated soils south of this zone around San Martin) indicate wet meadows with few oaks. This is corroborated by results from the correlations using 1939 relict oaks.

In particular, in one area east of Llagas Creek beginning around where the creek turns sharply south along the valley floor, a series of aguajes (a potable water supply or spring) dotted the valley floor. The aguajes, shown on an early (1840s) map of the area, appear to have been part of a larger wetland complex (fig. 7.9). This map suggests that the aguajes were surrounded by (undefined) wetland vegetation and included multiple ponds. The top aguaje on this map is labeled "aguaje chupadero." Gudde and Bright (1998) defines "chupadero" as "a brackish pool where animals come to drink," implying that at least one of the aguajes shown was saline.

These aguajes appear to coincide with the wet meadow soils mapped by Cosby and Watson (1927a) alongside Llagas Creek.

Figure 7.9. This 1840s diseño shows a series of aguajes (a potable water supply or spring) along Llagas Creek (here labeled "Arroyo Seco," or dry creek) as it turns south along the valley floor. One is labeled "aguaje chupadero," indicating saline conditions. Unlabeled vegetation is shown surrounding the aguajes. (U.S. District Court, Northern District [184-?]d, courtesy of The Bancroft Library, UC Berkeley)

Creeks and wet meadows

Many streams tributary to Llagas Creek were discontinuous, and even those with recognizable channels were extremely shallow. A number of broad swales can be identified in early aerial photography. Even Llagas Creek northwest of San Martin was relatively shallow, "intrenched [sic] from 5 to 10 feet below the surface of the soil" (Cosby and Watson 1927a). Many of these streams have remained extremely shallow, or have only been modified in the past few decades. Cross-sections and profiles of streams such as Center Creek, Maple Creek, and Tennant Creek made in 1975 show channels typically incised just 0.3-1 m (1-3 ft) below the adjacent valley surface (fig. 7.10; USACE 1975).

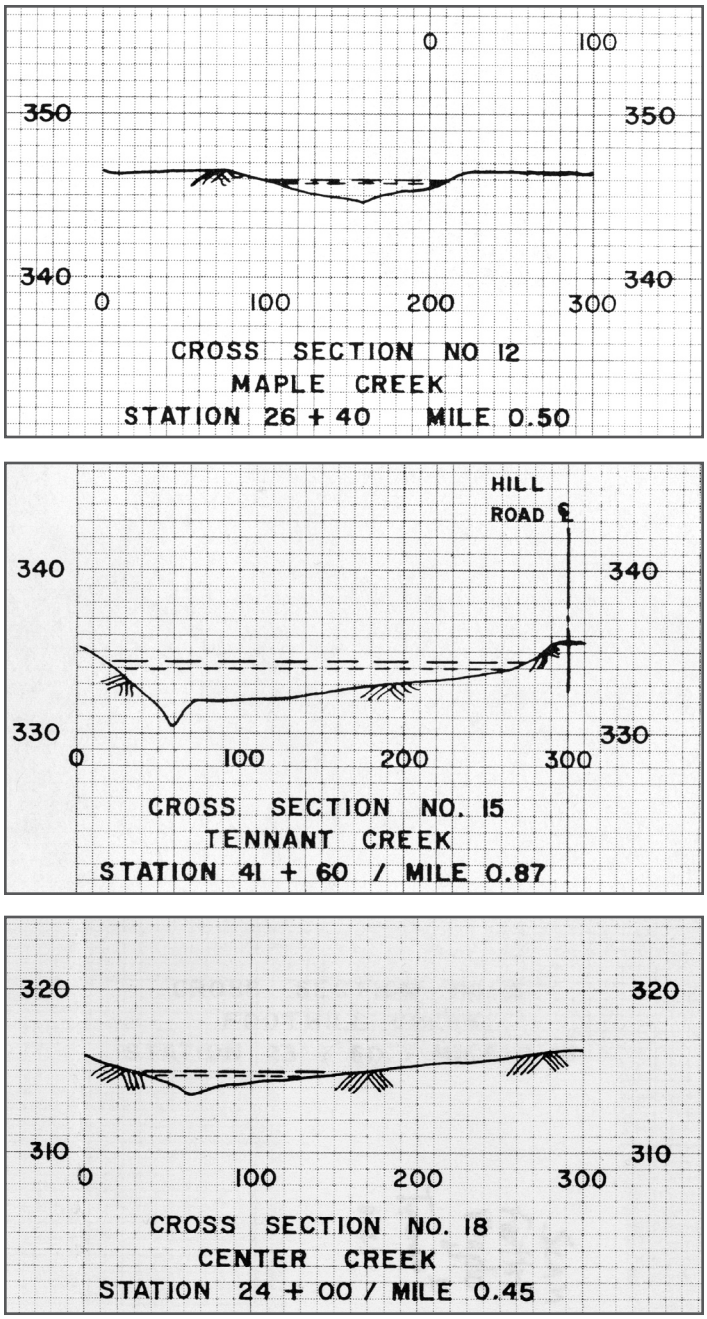


Figure 7.10. Creeks such as Maple, Tennant, and Center had broad and shallow cross-sections in the wet meadows east of Morgan Hill. In places, they could be considered sloughs or swales (cross sections have 10× vertical exaggeration). From USACE (1973).

Poza de las Llagas

Just north of the low spur of hills jutting into the valley north of San Martin, and west of Monterey Road, was the "Poza de las Llagas" (the las Llagas pool). The place was so central as a stopping point and water source along Monterey Road that it was also referred to simply as "Las Llagas" (referring just to the poza, not the entire creek; fig. 7.11):

> In speaking of this place many persons called it the "Las Llagas" but it is not the Arroyo de las Llagas which is understood when it is spoken of - it is in the arroyo, but it is one place, known by the name of "Las Llagas" to distinguish it from the arroyo at large, and it has been distinguished ever since I was a little boy (Pinto 1855b).

The Posa de las Llagas was also referred to as a well or a spring (Castro 1855b). It appears to have been a groundwater-fed, in-stream, perennially flowing pool. It was located "immediately above the pass called the Puerto Suelo [portezuela = pass or gap in hills]" (Castro 1853). This portezuela was likely the low topographical point (near the intersection of California and Coolidge Avenues) that served as a pass over the San Martin spur.

The poza was valued as a stopping place with a perennial source of fresh water, used as a campsite and for clothes washing by travelers and rancho residents:

> There is water on the place (Las Llagas) all the year around and people traveling about there were in the habit of camping there (Pinto 1855a)

> ...it was a stopping place and there was water there all the year round and people washed clothes there – it was called the "Posa de las Llagas" (Castro 1855b)

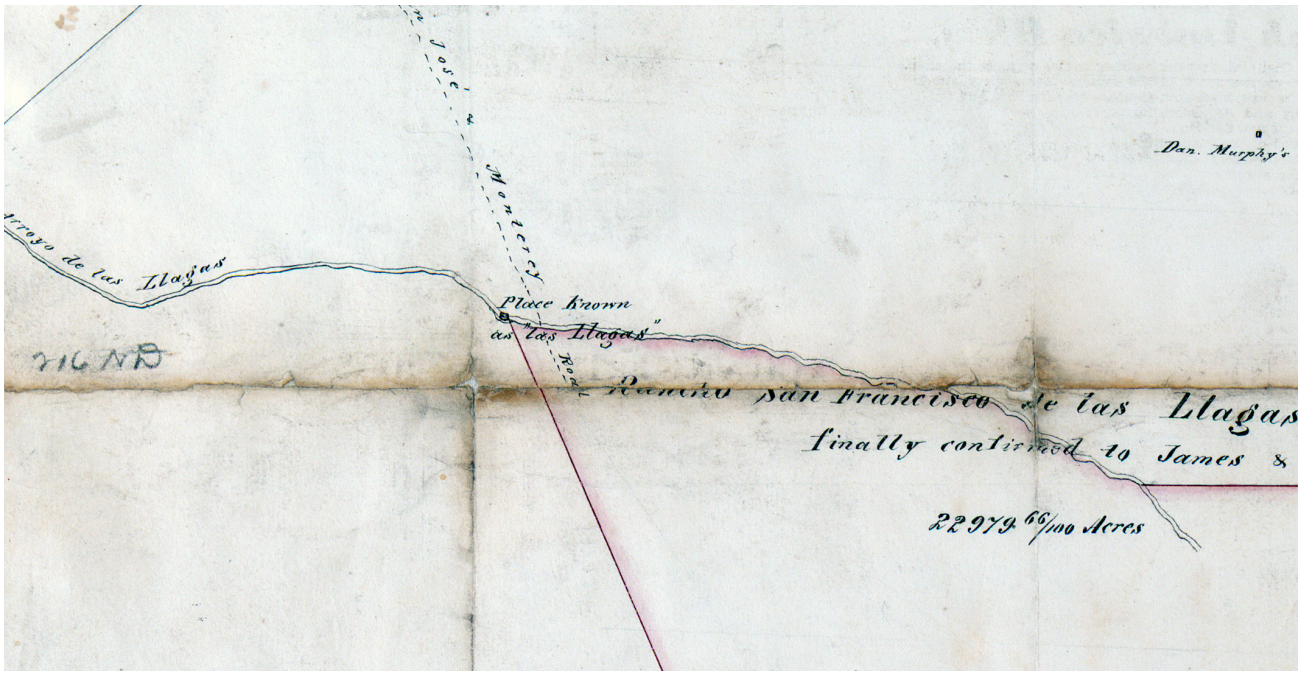


Figure 7.11. This early map shows the renowned pools (here labeled "Place known as 'las Llagas'") on Llagas Creek near the historical El Camino Real crossing. (U.S. District Court, Northern District 1860, courtesy of The Bancroft Library, UC Berkeley)

Figure 7.12. Llagas Creek, ca. 1908. This postcard shows the creek flowing in the winter with a sycamore without leaves on the bank. Gilroy Hot Springs Road presumably refers to present-day Leavesley Road. (Unknown ca. 1908 (Neg. no 13764), courtesy of the California Historical Society)

GILROY, UVAS CREEK, AND LOWER LLAGAS CREEK

Further south, beyond the dominant effect of the Coyote Creek fan, the valley was shaped by smaller alluvial fans from tributary creeks and narrow strands of higher land following present and former natural levees of Llagas Creek. For example, lowlands lay along both sides of the present Llagas Creek position, forming long wetland strands stretching for several miles. Old Gilroy was located on a natural levee of Llagas Creek, but the city was moved to even higher ground along the Carnadero to the east around 1869. A lobe of Carnadero Creek's alluvial sediment blocked Miller Slough-lower Llagas Creek's drainage into Pajaro River, causing even more extensive wetlands to form. Llagas Creek shifted from a braided channel to a meandering, single thread channel (fig. 7.12), before spreading into sloughs and distributaries in the vicinity of Pacheco Pass Road.

Seasonally flooded wet meadows covered large areas. These areas stayed relatively moist into the summer and were central to Gilroy's rise to prominence as a center of California's dairy industry (1.3 million pounds of cheese/year in 1896; 20% of the state's production), which was ascribed to the productivity of the "native meadow grasses" in the wet meadows south of the city. In 1896, Shortridge [1896](1986) recorded that "Gilroy's principal product is cheese, the succulent grasses which flourish along the creeks and in the low lands at the confluence of the several streams in the center of the valley, having early brought about the development of the industry."

Gilroy oak woodlands and sloughs

Around 1869, the current town of Gilroy was established west of Old Gilroy at a site with relatively dense oak woodlands. The combination of shade trees and well drained soils was ideal for settlement.

> *"[Gilroy] was formerly covered with groves of magnificent oak trees, many of which yet remain, giving to the locality a natural park-like appearance...The streets are broad, and the natural drainage, owing to the porosity of the soil, is excellent, so that the streets are neither muddy or sticky in the winter, and in summer they are kept well sprinkled."*
>
> – SHORTRIDGE 1896

The townsite occupied slightly higher ground with shallow, flood-prone drainages, including Miller Slough, on either side. This characteristic was noted by a traveler in 1874: "The country around Gilroy seemed low and flat, as though it might be easily undulated [sic] in the rainy season" (Likins 1874). There is some suggestion that sloughs in the vicinity of 8th St. were overflow channels from Uvas-Carnadero Creek. Surprise flooding of the otherwise innocuous-appearing sloughs has led to decades of flood protection efforts.

> Uvas Levee.—...the slough running easterly from the Uvas, became so swollen during the high stage of water [last winter], that it overcame its embankments and flooded the extreme southern end of our town, and wending its way toward San Y Sidro [sic], spread out into a vast lake inundating hundred of acres of valuable land and sweeping away fences, bridges, &c., to the damage of the entire community. ... The slough at the southern end of town became a little too full for its capacity, and quite a current broke over the northern bank and started "up town," crossing Monterey street south of the Swiss Saloon to the railroad track, thence in every direction indicated by gravity. The main slough washed away the bridge at the end of town, and then went rushing madly along towards San Ysidro, finally emptying itself upon the broad plain, which during the afternoon of Wednesday, looked like a great lake....We do not wish to see the travel diverted from the main street again, or lives imperiled in attempting to cross the main slough at the south end of Monterey street, when swollen by a mad current of water, which was the case last Winter. (November 27 1869, Gilroy Advocate 1869c)

Miller Slough historically drained into the wetlands alongside lower Llagas Creek. Its lower portion has been

disconnected from its upper portion, which was diverted directly into Llagas Creek and renamed West Branch of Llagas Creek:

> Several diversion alignments are included in the proposed plan. The West Branch of Llagas Creek and Miller Slough will be diverted around the City of Gilroy to avoid costly channel improvement work through urban areas. Miller Slough will also be diverted around the city of Gilroy to avoid costly channel improvement work through urban areas. Miller Slough will also be diverted into Llagas Creek approximately 0.3 mile above the Pacheco Pass Highway, and a channel will be constructed to take flows from Little Llagas Creek into Llagas Creek approximately 0.3 mile above U.S. Highway 101. (Division of Soil Conservation 1966)

Uvas-Carnadero Creek

While larger streams such as Bodfish and Little Arthur appear to have connected directly into the Uvas-Carnadero mainstem, many smaller tributaries discharged into their alluvial fans and probably only entered the creek as sheet flow during floods. The stream exhibited distinct morphology and riparian canopy architecture along its length, as discussed in Chapter 4. While there is only limited evidence for historical channel depth, downstream in the single thread reach an unfortunate accident suggested that the creek was quite deep. A man named Charles Taylor, working on the Carnadero Bridge (presumably at Monterey Road, or possibly the railroad crossing) in July 1874, died after falling "into the dry bed of the creek, a distance of 30 or 40 feet" (San Benito Advance 1874).

Some information about finer-scale riparian plant communities is provided by memories from Ascención Solorsano:

> We used to make swings of the runners of the chilicote at Las Uvas Creek at Gilroy. It used to grow there way up to the top of the cottonwoods. (Harrington 1929)

> The uvas silvestres [wild grapes] are also called uvas simarronas and uvas broncas, lots of them grow at Uvas Creek at Gilroy, they climb way to the tops of the cottonwoods and willows...Over toward the Solis Ranch where we used to camp in the fruit season, Uvas Creek is almost covered with wild grapes and chilicote and yerba del chivato. (Harrington 1929)

Solorsano's descriptions probably refer to the Uvas Creek reaches with denser riparian woodland and more base flow upstream of the Bodfish Creek confluence, where Solis Rancho was located. (This reach was consistently called Uvas Creek historically, while downstream was considered Carnadero Creek.) Historical fishing accounts also commonly referred to these upper reaches, e.g., "...the Uvas and its tributaries furnish excellent trout fishing..." (Harrison ca. 1888; fig. 7.13).

> *"... Uvas Creek is almost covered with wild grapes and chilicote and yerba del chivato."*
>
> – ASCENCIÓN SOLORSANO, 1929

Chilicote (Chilicothe) refers to Coast wild cucumber, a native perennial vine (*Marah fabaceus*) also known as California man-root because of its giant tuberous root (Parsons 1909). Yerba del chivato refers to creek or Western white clematis (*Clematis ligusticifolia*). One of the few early botanical records from Santa Clara County (recorded in 1962 along lower Carnadero Creek between Highway 101 and the willow groves) contains a very similar description of Western white clematis "clamoring over shrubs" (Seeno 1962).

Lower Llagas Creek and wetlands

The lower Llagas Creek region (from around Gilman Road south to the Pajaro River) supported a mosaic of seasonal wet meadow, perennial freshwater marsh, and seasonally dry ponds and lakes. On the flat, low land around Old Gilroy, Llagas Creek spread into a shallow, poorly-defined channel, then into multiple channels traversing the marshy areas. These channels drained through the large willow grove at the bottom of Llagas

Creek into "Pajaro Lake" (Day 1854), a large, seasonal lake connecting the bottom of the Llagas with the head of the Pajaro River.

> *"...the cienega or swamp into which the Llagas flows..."*
>
> – Hoffman 1864

Many people noted the tendency to flood around Old Gilroy. One resident, frustrated by a proposal to build a road from Hollister to Gilroy through the lowlands east of Old Gilroy, wrote that

> The water, or I might term it a moving lake, has been known to be between two and three miles wide, and from thee [sic] to ten feet deep on this proposed road. Dam up this moving lake with a road, culvert it as you will, you cannot make it a road for winter. (Gilroy Advocate 1869a)

Modern Frazier Lake Road, which roughly follows this proposed route, was at this time no more than a dead-end road servicing individual farms.

Hoffman (1864) described the region as "the cienega or swamp into which the Llagas flows." Harrison (ca. 1888) described the general area: "[Llagas Creek] follows its channel to a point near Old Gilroy, three miles south-east, where it finds a low, flat country, and spreading out over many hundred acres, forms a tule swamp." As late as the 1950s, the lower reaches of Llagas Creek were poorly defined and flood-prone: "In this lower section [the last 3.5 mi of Llagas Creek] the channel is not well defined, and the stream overflows quite regularly during flood periods" (Blackie and Wood 1939).

Though it flooded easily, early farmers recognized the potential value of this land for agriculture and dairy production. Coffin (1873) noted that "in the regions receiving the outflow of the Uvas and Llagas creeks, in what is known as 'willow land,' we have a rich, quick, warm alluvium, fine for corn, but especially valuable for gardening purposes." The catch was that the soggy land needed to be drained before it could be cultivated. Harrison (ca. 1888) predicted that since the swamp land around the lower Llagas "can be drained into the Pajaro river, the day is not far distant when it will all be re-claimed; in fact, much of it has already been made tillable." By the 1890s, extensive ditch systems were in place in the Bloomfield Road/Pacheco Pass Road region east of Gilroy to drain this land (Herrmann 1894, Herrmann Bros. 1890).

Miller Slough wetlands

Between Gilroy and Old Gilroy, the landscape was dominated by expanses of perennial freshwater wetland and seasonal wet meadow on the Dublin clay adobe and Dublin clay loam soils which covered the area. Surveyor William Lewis (Lewis and White 1853, Lewis 1853a) illustrates the westward transition from willow grove to the east and freshwater marsh to the west: on the east side of Llagas Creek, he notes "swamp" and "willow swamp" (that is, willow groves), and on the west side of Llagas Creek he notes "marsh and swamp" (that is, willow groves and marshes). This is consistent with our mapping, which shows willow grove on either side of the historical Llagas Creek channel and large swaths of freshwater marsh exclusively on the western side of the Llagas. This band of marsh covered much of the large areas of wetland soils (Dublin adobe, Dublin clay, and muck and peat) between Gilroy and Old Gilroy. Supplied by Miller Slough and Llagas Creek overflow, this area extended from just south of Gilman Road to about Carnadero, crossing Miller Slough and Pacheco Pass Road.

To the north, seasonally dry wet meadows dominated the landscape. Day (1854), surveying the region in June, described the area's seasonality. He noted that it was "meadow land, wet in winter," would be "in wet weather, among green grass" and that there was "no timber except for a few oaks round Martin's house."

Figure 7.13. Uvas Creek, which historically referred to the reaches upstream of the Bodfish Creek confluence, is shown as a relatively densely vegetated, perennial stream in these two images. "Scene on Uvas Creek" (A), taken near Adams School in the vicinity of Adams-Chitactac County Park, shows large pools in the foreground and background, with a shallow riffle in between. An undercut alder can be seen on the bank at left. (A (Unknown ca. 1930) and B (Unknown ca. 1912b): courtesy of the Gilroy Museum)

Lower Llagas willow thicket

> *"From this point I meandered down the Arroyo de las Llagas through a dense willow thicket..."*
>
> – WALLACE 1858

To the east of the perennial freshwater wetlands, around the current location of the lower Llagas Creek channel, a vast willow grove (approximately 280-320 ha/700-800 ac) extended from Old Gilroy (just south of Pacheco Pass Road, and east of the modern Llagas Creek channel) south past Bloomfield Avenue (fig. 7.14). The northernmost extent of the willow grove is just below Pacheco Pass Road, indicating that this segment of the road was constructed to circumvent the northern edge of the willow grove. Quentin Ortega and John Gilroy, the owners of the two San Ysidro ranchos, built their houses on a tongue of slightly higher, better drained Yolo silt loam on the edge of this willow thicket, about a tenth of a mile from where Dyer (1861) recorded the "edge of a dense willow thicket" (fig. 7.14).

Early surveyors recorded traversing a "dense willow thicket" (Wallace 1858, Upson 1867(?)). This willow grove, unlike the sausal at the lower end of Carnadero Creek, had inclusions of freshwater marshes and ponds in addition to the dense willow thickets. McDonald (1852(?) b) calls the region "willow and tule swamp" (rather than just "willow swamp," as at the bottom of Carnadero Creek) and depicts a mosaic of the three habitats (see fig. 5.8). Dyer (1861) also noted a transition within the willow grove (remarkably consistent with that mapped by McDonald six years earlier) between willow thicket and tule-filled freshwater marsh. He records the point where he exits the willow grove and enters "a tract of low marshy land covered with tule and flags."

Multiple sources indicate that Llagas Creek flowed through at least part of the large willow grove at its base. Salvio Pacheco (1861) testified that "the arroyo de las Llagas emptied in the tular, and from the there the waters are run into the Pajaro"; José Castro (1855a) called it "a willow swamp where Las Llagas overflows." Well into the willow grove, surveyor Dyer (1861) noted that the channel was "24 links [5 m/16 ft] wide," indicating that the channel was wide well into the willow grove. These testimonies support both that Llagas Creek entered the willow grove a substantial distance before spreading, and confirms the image of the area as a willow grove with tule patches within it.

Soil surveyors Cosby and Watson (1927a) noted the inherent flooding challenges associated with the alluvial topography, and the limited success of drainage efforts:

> During comparatively recent times, Llagas Creek has been somewhat dammed off from its natural outlet by the deposition of alluvial sediments by Carnadero Creek, and a condition of very poor drainage has developed. In spite of a drainage ditch of more than a mile in length that was constructed recently, the water table in this vicinity is usually within 3 feet of the surface during the drier part of the year, and during the rainy season the surface is inundated in places to a depth of 6 feet. Sedges and water-loving plants are the main vegetation, and two bodies of muck and peat have accumulated...a considerable tonnage of meadow grasses are cut for hay on the better drained spot. The greater part of this region can only be used for summer pasture for dairy cows.

Pajaro Lake and other seasonal lakes

At the bottom of Llagas Creek, at the southernmost extent of the willow grove, many early surveyors mapped a large (over 40 ha/100 ac at its greatest extent) lake. Though the western edge of the lake was followed by some surveyors to mark part of the western boundary of the San Ysidro (Ortega) Rancho, other surveyors (notably those surveying in late summer) went straight through a dry plain where others noted a lake (see fig. 5.10).

Across seasons, the lake fluctuated widely in extent, even drying up in the late dry season, indicating that it was

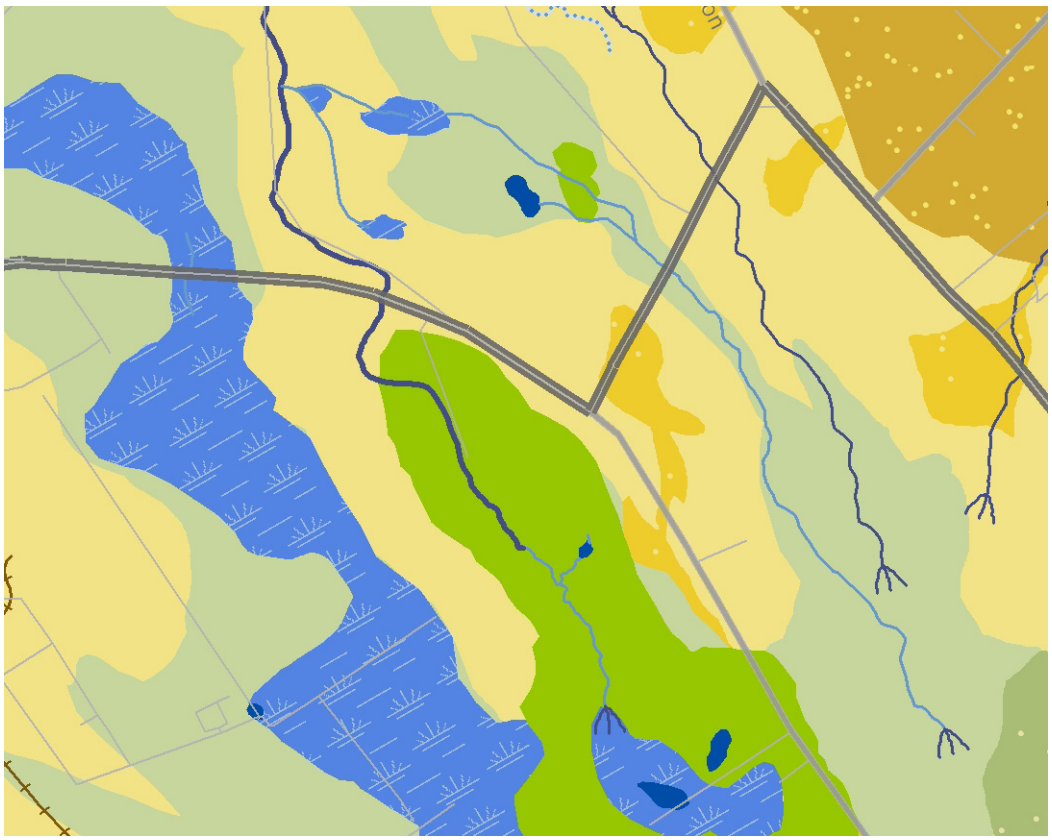


Figure 7.14. The GIS of historical habitats here shows the wetland mosaics surrounding Llagas Creek at Pacheco Pass Road. Immediately upstream of the road, the creek (flowing south in the center of the map) overflowed into the Jones Creek drainage. Downstream of the crossing, it spread into willow groves and freshwater marshes. (See inside front cover for map legend.)

an extremely shallow feature (consistent with the area's topography). In January, Hardenburgh (1872) recorded the "end of willow thicket where the water begins to spread out into a lake" about a quarter mile north of Bloomfield Road. In March, Wallace (1858a) surveyed the San Ysidro (Ortega) Rancho, mapping the lake at approximately 45 ha/110 ac. In April and May, Wallace (1858b) conducted a similar survey, this time for the adjoining Las Animas Rancho. Only one or two months after the March survey, the lake had shrunk considerably: Wallace mapped it at just over 20 ha/50 ac, about half of its previous size. In June 1854, there was still enough of a lake present for Day (1854), who called it "Pajaro Lake," to sight to it from a low hill on the eastern side of the valley near San Ysidro Creek, about three miles away.

By September, however, surveys across a variety of years no longer recorded any lake at all. Dyer (1861) noted only "a level plain" where the lake would have been. Lewis (1850b), another September surveyor, also made no mention of it nor deviated from his survey line to go around the west bank, only describing the general area around the lake as "low marshy ground."

At its largest mapped extent, Pajaro Lake was approximately the same size as historical San Felipe Lake. However, Pajaro Lake was not recorded on any diseños depicting the area (e.g., McDonald 1852(?)c; U.S. District Court, Northern District 1873a,b), and none of our narrative sources mention it. This supports the model of a seasonal lake of variable size that did not serve as a

cultural resource or landmark of note in the same way as did San Felipe Lake.

The nature of the connection between the Pajaro River and Pajaro Lake remains unclear. Some maps (e.g., Wallace 1858a; U.S. District Court, Northern District 1860; Geological Survey of California 1873) show the lake as the beginning of the Pajaro, with a clear connection between them (fig. 7.15). This would fit well with Day's (1854) label of "Pajaro Lake" - the role that San Felipe Lake, not Pajaro Lake, plays for the Pajaro River today. However, Lewis (1850b), describing the survey of the Las Animas Rancho, makes no mention of a connection; rather, he follows a "small tributary" off the Pajaro to the tributary's head before heading northwest through the "intervening marshy ground" where others recorded the lake. This small tributary at the head of the Pajaro was likely the "Arroyito or Aguage [sic] de los Cuatro Sauces" –the little creek or spring of the four willows, named for the landmark grouping of four willow trees along the Pajaro River and mentioned in the San Ysidro (Ortega) land grant case file (Gonzales 1833). It is possible that in some years or seasons, the lake and river were not connected, while at other times they were connected through a shallow channel or system of swales.

Though Pajaro Lake was by far the largest seasonal lake in the lower Llagas area, it was not the only one. Many small lagunitas dotted the area, occurring in larger pockets of freshwater marsh and willow groves (see fig. 7.2). One such lagunita recorded a corner of the boundary line between the San Ysidro (Gilroy) and Las Animas ranchos. It similarly was recorded as dry or of variable size, dependent on the season. Where winter surveyors (e.g., Hargenburgh 1872) noted a lagunita, a survey likely conducted in late summer or early fall noted a "small dry lagunita" (Upson 1867(?)). Hoffman (1864) called it a "small lagoon which spreads out to the marsh of the lands of the late Ignacio Ortega," conjuring a picture of a shallow lake only slightly lower than the marsh around it. By 1894, the spot was labeled only as "The Rock Corner" (after a boulder thrown into the lake to mark the corner in 1850; Herrmann 1894). It is likely that by this point, the extensive draining of the area had made the former lake a permanently dry feature.

CARNADERO CREEK

At its downstream end, Carnadero Creek spread into a large willow grove before joining the Pajaro River east of its current confluence. This area (south of Gilroy and

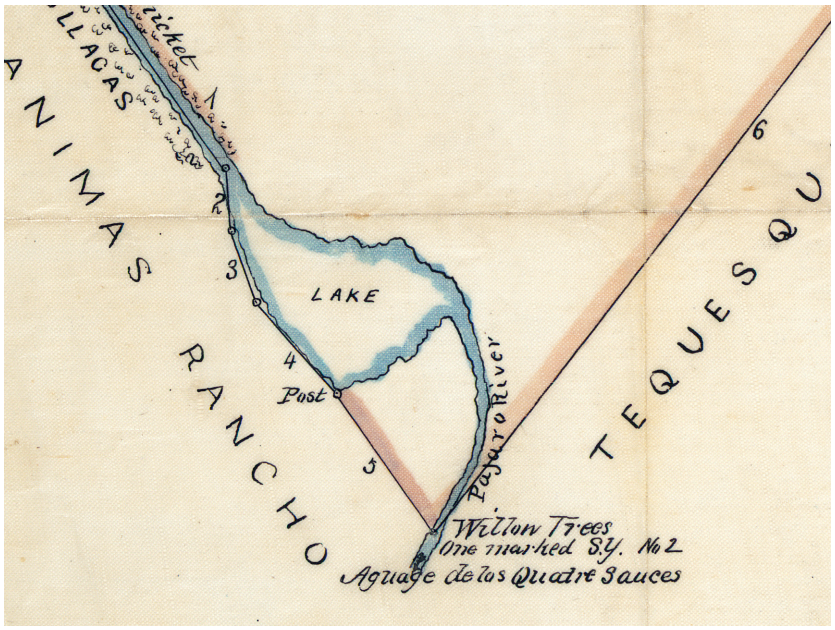


Figure 7.15. This map, from a March 1858 survey (Wallace 1858a), shows a schematic version of the connection between Pajaro Lake and the head of the Pajaro River. Here, the lake is shown as a connecting feature between the mouth of Llagas Creek and the origin of the Pajaro River. (Courtesy of The Bancroft Library, UC Berkeley)

north of the Pajaro River) was characterized by a mosaic of willows, freshwater marshes and ponds, and multiple channels of the Carnadero and other small creeks from the west spreading out into the willows.

Pozas de Carnadero

Several perennial ponds west of El Camino Real and south of Carnadero Creek were an early 19th-century landmark, and provided the site for Mariano Castro's home on the Las Animas Rancho. Many diseños (e.g., McDonald 1852(?) a,b,c; U.S. District Court, Northern District 1873a,b) show multiple ponds interspersed in a creek channel, while others (e.g., U.S. District Court, Northern District [184-?] c, U.S. District Court, Southern District [184-?]c) show a single, proportionally large "Poza," the latter indicating adjacent wetland vegetation and trees (fig. 7.16). One map names the poza "Posa Animas" (U.S. District Court, Northern District 1861). The pozas were probably large perennial pools on Gavilan Creek, which was called "Arroyo de las Pozas." Interestingly, there is an anomalous patch of clay soils along the creek here (Cosby and Watson 1927a). It is possible that, as in other parts of the Santa Clara Valley, the fine-grained soils formed a dam to groundwater movement, causing near-surface groundwater to emerge at the surface. Little or no trace of the creek and these features is visible today.

Carnadero willow grove

The historical spreading of Carnadero Creek into a willow grove in the vicinity of present-day Bloomfield Avenue is well-documented by numerous sources. McDonald (1852(?)a,b,c) and Thompson and West (1876) referred to the feature as a "Willow Swamp," while earlier Mexican-era maps (e.g., U.S. District Court, Northern District 1873a,b) used the equivalent phrase "Sausal." Lewis (1851) set a point in "the Willows." GLO surveyor Hardenburgh (1872) crossed the feature, defining its margins with corresponding points labeled "Enter swamp and willows" and "Leave swamp and willows." This outer boundary encompasses the earlier sources despite its later date, suggesting that it took decades to fully remove the feature. A central portion of the willow grove was mapped as "Muck and peat" by the 1923 USDA soil survey (Cosby and Watson 1927a), reiterating its wetland origin.

Figure 7.16. A detailed drawing of the "Poza de Carnadero" suggests surrounding wetlands and trees, as well as a direct connection to the creek. (U.S. District Court, Northern District [184-?]c, courtesy of The Bancroft Library, UC Berkeley)

Based on their own historical research, Shortridge ([1896]1986) later described "the rich delta land at the mouth of Carnadero Creek, near Gilroy... at that time covered with a dense growth of willows," while Broek (1932) reported "a willow covered marsh, formed by the Carnadero Creek which spread its water over a flat basin."

> *"Here a willow covered marsh, formed by the Carnadero Creek which spread its water over a flat basin, was drained and a dairy started on the cleared land."*
>
> – BROEK 1932

There does not appear to have been a singular well-defined Carnadero Creek channel through the willow grove recognized in the mid-19th century, before Samuel Rea "opened a channel for Carnadero Creek" (Shortridge [1896]1986). However, there were likely multiple smaller channels defining flow paths through the willow grove. Lewis (1851) recorded a point just north of the willow grove as "the point where the 'arroyo del Carneadero' begins to branch into several channels," implying that multiple, smaller channels existed at least toward the head of the grove. Herrmann (ca. 1870) confirms this, showing a number of small distributary channels or sloughs spreading through the willow grove from the mouths of Carnadero and Gavilan creeks (fig. 7.17). Thompson and West (1876) also suggest the presence of somewhat defined drainage channels, albeit discontinuous or partially occluded by vegetation. While Shortridge implies that Rea constructed a channel in the 1860s, multiple sinuous or discontinuous channels are shown by maps to the 1870s. As late as 1908, Carnadero Creek is shown with multiple sinuous channels through the former willow grove (McMillan 1908(?)). The USGS quad (1917, surveyed 1915) finally shows a single, relatively straight channel through the area.

The willow groves also encompassed what are now considered the lower reaches of Gavilan and Tick creeks, extending west across the present-day railroad alignment. Smaller open water pond areas and tule marshes were probably found within the larger willow swamp. In fact, a relatively large freshwater marsh component is strongly suggested by historical evidence on the southwestern margin of the willow grove near the mouth of Tick Creek. There was a well-recognized ciénega shown by diseños of the Rancho Juristac (U.S. District Court, Northern District [184-?]c, U.S. District Court, Southern District [184-?]c; fig. 7.18). This feature presumably led to the name of an 1840s adobe in the vicinity called "La Ciénega" (Milliken et al. 1993). Based upon the relationship of the ciénega to the historic location of the Rancho La Brea adobes, Tar Creek, Tick Creek, and the El Camino Real, the ciénega would appear have occupied the vicinity of present-day Tick Creek near the Southern Pacific railroad crossing and Highway 101. This location corresponds with freshwater marsh symbols shown by USGS (1917) and an area of "Muck and peat" shown by Cosby and Watson (1927a; this category is not common in the map).

Former route of Carnadero Creek

Until sometime in the mid-1800s, lower Carnadero Creek likely followed a dramatically different channel than the one it follows today. In 1880, Healy (1880b, in Milliken et al. 1993) shows the current alignment skirting the eastern edge of the willow grove, which he labeled "New Channel of Carnadero Creek," indicating that it was a relatively recently created main channel. Historical maps and surveys provide some evidence for the route of the old channel.

The earliest maps (Geological Survey of California 1873; U.S. District Court, Northern District 1873a,b) show Carnadero Creek continuing east to the Pajaro River, rather than turning south at Bloomfield Avenue (fig. 7.19). Instead of passing through the willow grove before joining with Tar Creek (as depicted in maps of the 1870s and 1880s), the old channel veered southeast just south of modern Bloomfield Avenue, departing from the current Carnadero Creek channel just south of where Lewis (1851) recorded that "the 'arroyo del Carneadero' begins to branch into several

channels." A former meander or oxbow of Carnadero Creek at Bloomfield Avenue, shown by McDonald (1852(?) a,b,c) extending eastward several hundred meters across the position of the present-day railroad, may provide an additional clue to the location where the former channel course deviated from the modern course. It traversed a mosaic of willow groves, freshwater marshes, and ponds east of the railroad tracks before joining the Pajaro River east of the railroad tracks and Bolsa Road.

These historical data suggest that Carnadero Creek spread into a broad array of distributaries at Bloomfield Avenue, supporting willow groves, freshwater marshes, and seasonally overflowed meadows. This evidence corresponds closely with soils data showing multiple lobes of Carnadero Creek's alluvial fan radiating north, east, and south from the present-day Bloomfield Avenue crossing. While the creek has presently been confined to a southerly route, it clearly distributed water over a much broader area historically.

Figure 7.17. This close-up view of the Carnadero Creek willow grove shows multiple internal channels; such features were likely common in willow groves. (Herrmann ca. 1870, courtesy of the Office of the Santa Clara County Surveyor)

At the far end of the creek course, the confluence of the historical Carnadero Creek channel and the Pajaro River is well-documented by multiple GLO surveyors, who noted the confluence as "Carriadero [sic] Creek [joins the Pajaro] from west" (Terrell 1858) and "Canadiro [sic] Creek joins [the Pajaro] from the west" (Hardenburgh 1872). A probable remnant of this alignment is still visible in contemporary aerial photography, in the form of a wooded channel extending about 300 m (980 ft) northwest of the Pajaro just north of the Southern Pacific railroad crossing.

The rest of the historical creek course is less well-documented. Substantial evidence for an array of wetlands and surface drainage extending east from

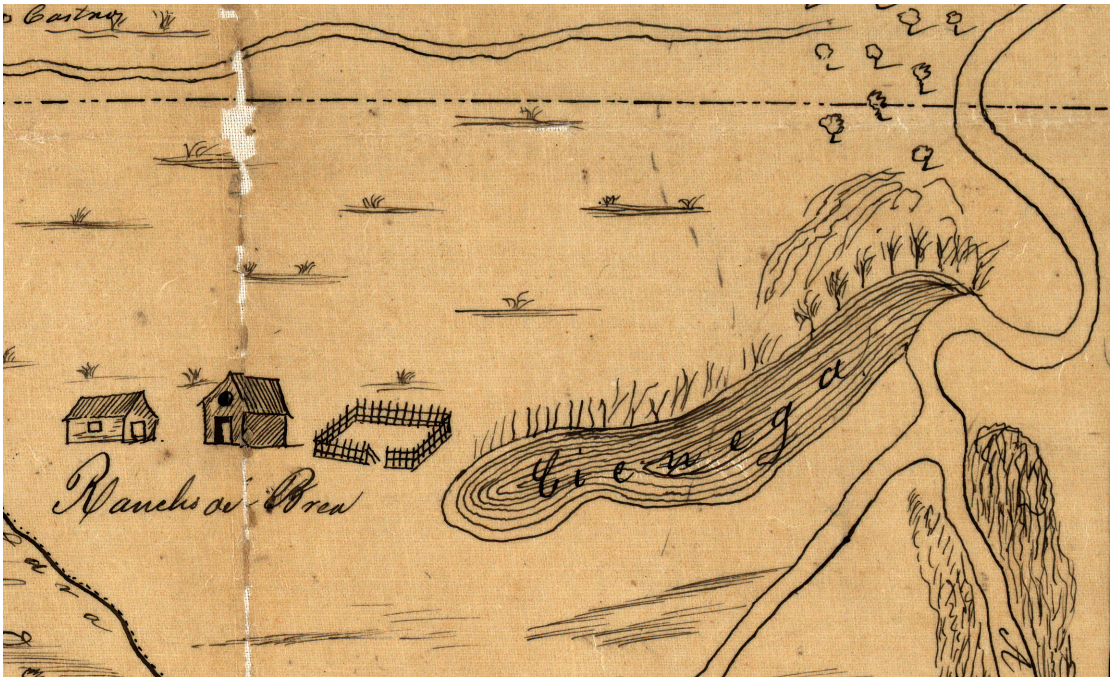


Figure 7.18. The ciénega, or freshwater marsh, near the mouth of Tick Creek. (U.S. District Court, Northern District [184-?]c, courtesy of The Bancroft Library, UC Berkeley)

Carnadero Creek to the Pajaro River, above the Carnadero willow grove, may provide a clue to the historical channel alignment. A series of elongate ponds with surrounding marsh and patches of willow grove are shown along this general alignment by Herrmann (ca. 1870; fig. 7.20). These may be remnants of wetlands along a defined Carnadero Creek channel, or may be evidence for a diffuse drainage of sloughs and wetlands that formed the bottom of Carnadero Creek. The odd angles of Bolsa Road in this area may have been designed to avoid these wetlands. Portions of the historical creek course may also have been preserved in the shape of a property boundary, shown by Thompson and West (1876) and Herrmann (ca. 1870). The oddly-shaped boundary follows the general trend of the willow groves, marshes, and ponds shown on the Herrmann map, and ends very close to the known location of the historical confluence with the Pajaro River.

While it is possible that the wetland features shown on the Herrmann (ca. 1870) map portray a remnant of a much larger wetland complex, such a feature is not represented on any map, indicating that even when Carnadero Creek flowed toward the southeast the major wetland feature remained the large willow grove to the south of the creek. This spatial pattern is depicted in several diseños (U.S. District Court, Northern District 1873a,b), which show Carnadero Creek flowing to the north of the large willow grove rather than through it (fig 7.19). These maps show the Llagas and the Carnadero joining east of the sausal, indicating that what is now called the Pajaro River (between the mouths of Llagas and Carnadero creeks) was much less clearly associated with the Pajaro River in the mid-1800s.

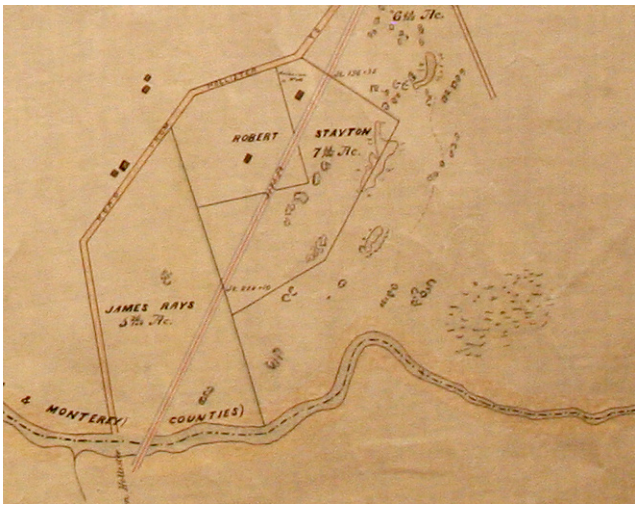


Figure 7.20. A detail from a ca. 1870 map of south Santa Clara County shows a series of willow groves, ponds, and wetlands northeast of the SPRR line (in red) and Bolsa Road (in yellow). These features likely marked a historical route of Carnadero Creek. A large wetland (indicated by a series of dashed lines) is shown at right. The Pajaro River runs at the bottom of the image. (Herrmann ca. 1870, courtesy of the Office of the Santa Clara County Surveyor)

Figure 7.19. This early diseño shows Llagas Creek (horizontal, at top) and Carnadero Creek (vertical, at right). The large Carnadero Creek willow grove (labeled "sausal") is shown to the south of the old route of the creek. The large willow grove/wetland mosaic at the bottom of Llagas Creek (labeled "sienega [sic]") is shown with a different pattern than the Carnadero willow grove, indicating that the two features had distinct characteristics. Llagas Creek and Carnadero Creek are shown joining east of the Carnadero sausal, indicating that what is now called the Pajaro River – between the mouths of Llagas and Carnadero Creeks – was not associated with the Pajaro in the mid-1800s. (U.S. District Court, Northern District 1873b, courtesy of The Bancroft Library, UC Berkeley)

While it is unclear when the former Carnadero channel was abandoned, it was likely around the mid-to-late 1860s. Healy's 1880 map labels the current alignment as the "New Channel of Carnadero Creek" but does not show the older channel (Healy 1880b, in Milliken et al. 1993), indicating that the change was fairly recent. However, most maps from the 1870s show no trace of the older channel, also suggesting that the change predated those surveys.

Tar Creek

While Carnadero Creek had no historical confluence with the Pajaro River at the location of its modern confluence, historical evidence suggests that Tar Creek joined the Pajaro River in roughly the same location as does the Carnadero today. Hardenburgh (1871) describes the confluence between Sanjón de la Brea [Tar Creek] and the Pajaro River:

> ...on this Rancho, what is known as the "Sanjon de la Brea" takes its rise, and empties into the Pajaro River, near the South East corner of this Rancho; and the mouth of this Sanjon, or Tar Creek, was called by the Californians "Punta del Sanjon de la Brea."

Use of the term sanjón, which can translate as "ditch" but locally seems to more commonly refer to shallow channels or sloughs (e.g., Grossinger and Brewster 2003), is reinforced by the observation that Day (1854) did not note the stream when his GLO survey crossed the area.

Thompson and West (1876) also show no confluence of Carnadero Creek with the Pajaro River. Instead, they show Tar Creek coming down from the west before veering sharply south at the bottom of the Carnadero willow grove to join the Pajaro River (fig. 7.21).

UPPER PAJARO RIVER AND THE WESTERN BOLSA

The Pajaro River was a well-defined, meandering channel from the San Benito confluence upstream to Llagas Creek, but upstream of this point drainage was a series of shallow sloughs, swales, and wetlands. The true head of the Pajaro River was considered to be where waters from Llagas Creek flowed through Pajaro Lake to form the river (Lewis 1850b).

One of the noteworthy characteristics of the river, as shown in early aerial photography and 19th-century maps, is the many small drainages feeding into the main stem downstream of the Llagas confluence. Many sloughs entered the Pajaro from present and former drainages of the Carnadero, as well as small channels carrying

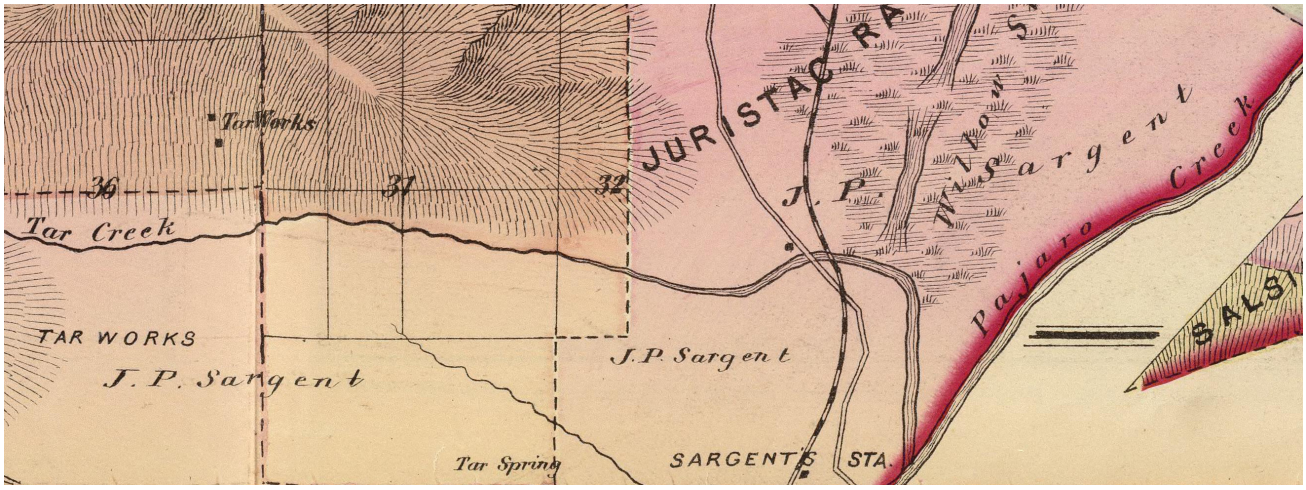


Figure 7.21. Historical evidence suggests that Tar Creek joined the Pajaro River near the present confluence of the Pajaro with Carnadero Creek. This Thompson and West (1876) map shows Tar Creek turning sharply south before joining the Pajaro. Carnadero Creek is shown to the north as broken, wide channels traversing the willow swamp. (Thompson and West 1876, courtesy of the David Rumsey Map Collection)

overflow from the Bolsa to the east. These small channels or sloughs drained the surrounding lowlands directly into the Pajaro channel, suggesting that there were not large natural levees along the channel and that the river was well-connected to its floodplain. Very little trace of these channels is evident in contemporary aerial photography.

> *"Many times we helped her gather pil [Calandrinia ciliata seeds, or redmaids] on the banks of the Pajaro River and on the meadow that adjoins La Hoyoria. She used to make us go into the water to get the little tender roots of the round tule."*
>
> — ASCENCIÓN SOLORSANO, 1929

Additional evidence about riparian habitat on the upper Pajaro mainstem comes from Healy's original survey for the county line, which was defined by the river. Healy (1858a) makes a distinction along the upper Pajaro between reaches with and without "timber." This distinction likely reflects a difference in riparian forest structure, with "timber" referring to larger trees of potential practical use such as cottonwoods, sycamores, and oaks, in contrast to a lower canopy of willow trees and shrubs. Accordingly, in the reaches he describes with timber, Healy notes a sycamore and "double oak"; in the areas without timber the only trees he records are willows. Healy's distinctions may explain the differences among descriptions of the Pajaro's riparian composition. Depending on where travelers crossed, they may have encountered a dense willow canopy or more mixed stands of taller trees.

Upstream of the Llagas Creek confluence, Healy stated that "Timber ceases here" and noted only willows. Willows were reported, apparently as stand-alone small clumps ("a grove of willows," "double willow") upstream along the Pajaro "slough" to only about one-half kilometer (0.3 mi) upstream of the Llagas confluence, with no riparian trees reported along the remaining length to San Felipe Lake. This pattern of sparse small trees continuing upstream of the confluence for several hundred meters and no trees further upstream along the salty sloughs of the alkali meadow is reiterated in 1939 aerial photography.

Day (1854) crossed the Pajaro River near its confluence with Tar Creek in 1854. He recorded both the channel geometry of the river at that point (with 3-5 m/10-15 ft steep bluffs, islands, ponds, and side channels) and the riparian vegetation along the floodplain (mostly dense willows). A detailed diagram of the river's characteristics at this point is shown in fig. 7.22.

Confluence of Pajaro River and San Benito River

The confluence of the San Benito and Pajaro rivers, up to the Pajaro River just upstream of the confluence to Sargent, has long been a place of note for local residents. Long before the construction of Highway 101, this stretch of river was crossed by native inhabitants, Spanish explorers, and Mexican and American settlers traveling from the San Juan Bautista area to points north of the Pajaro River.

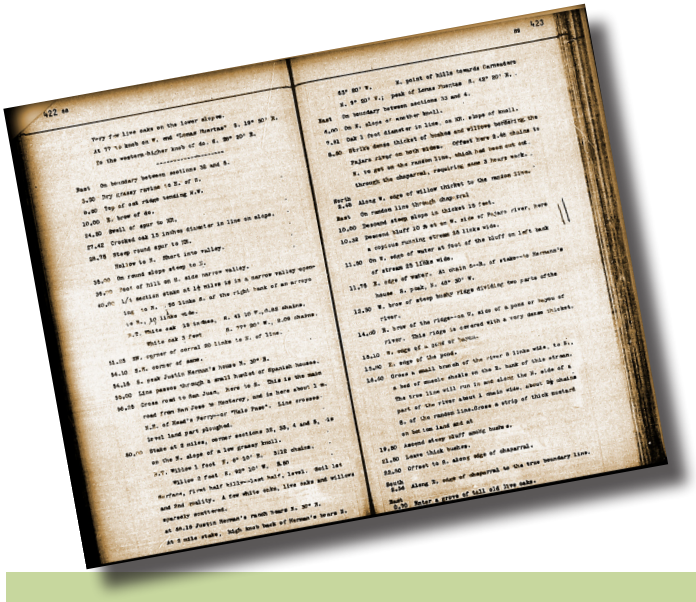
> *"There were many baptisms in the Pajaro river, at its junction with the San Benito river."*
>
> — MYLAR 1929

The confluence itself covered a wide area, including an island in its center and a deep pool (fig. 7.23).

> *"...they used to fish at night, and the fish would come to the top of the water, so they could even catch them with their hands, they used to fish more at night than in the daytime. That was at La Poza, where the Sargent [Pajaro] River joins the San Benito. That river used to be very deep, it has been drying up ever since the time that I was born."*
>
> — ASCENCIÓN SOLORSANO, 1929

The large pool at the confluence of the Pajaro and San Benito Rivers was called "La Poza" or the "Poso de Sanchez" in the 19th century (Harrington 1929, Pierce 1977). Over the historical record, the large, deep pool was used a gathering place for a variety of community activities. Ascención Solorsano recalled that "they used to fish at night" on rowboats at the pool (Harrington 1929). According to local historian Marjorie Pierce, the Larios family would go on outings to the pool to swim and pick blackberries during the summer (Pierce 1977). The area was used for baptisms (Mylar [1929]1985), and the sandy beach at the confluence was the site of picnics (Pierce 1977). After the San Juan Bautista Mission was established, the island at the confluence was the site of a ranchería—called "Ranchería de la Islita"—for Ohlone who had been brought into the Mission (Milliken n.d.).

The Pajaro River shifted in morphology and ecology at the confluence with the San Benito River, from a sinuous,



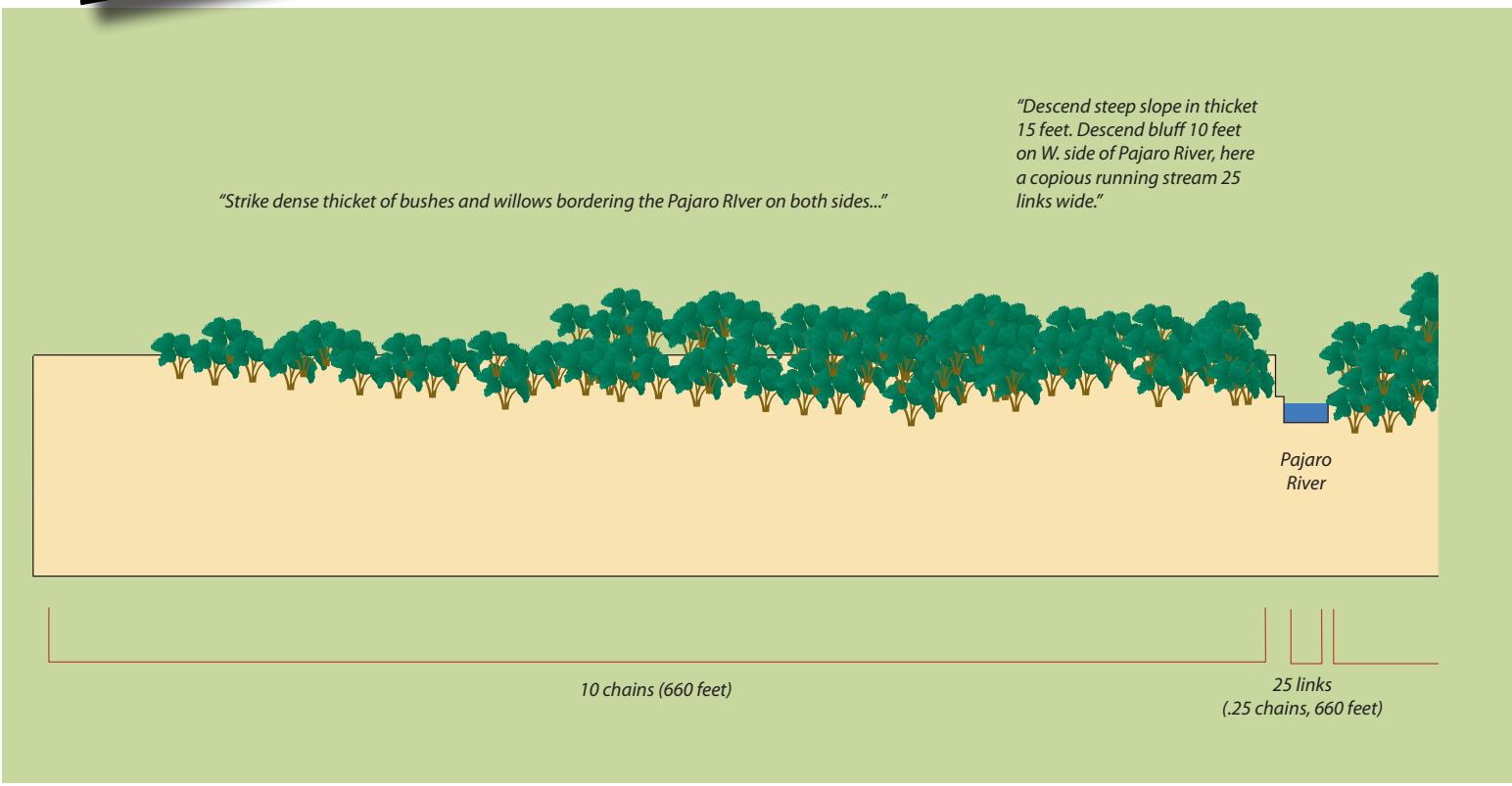


Figure 7.22. Riparian floodplain characteristics of the Pajaro River in 1854, as per Day's 1854 survey notes (above left)

wooded, single thread channel to a broad, braided channel. Stimson (1944) discusses the major effect the large sediment supply from the braided San Benito River channel had on the Pajaro:

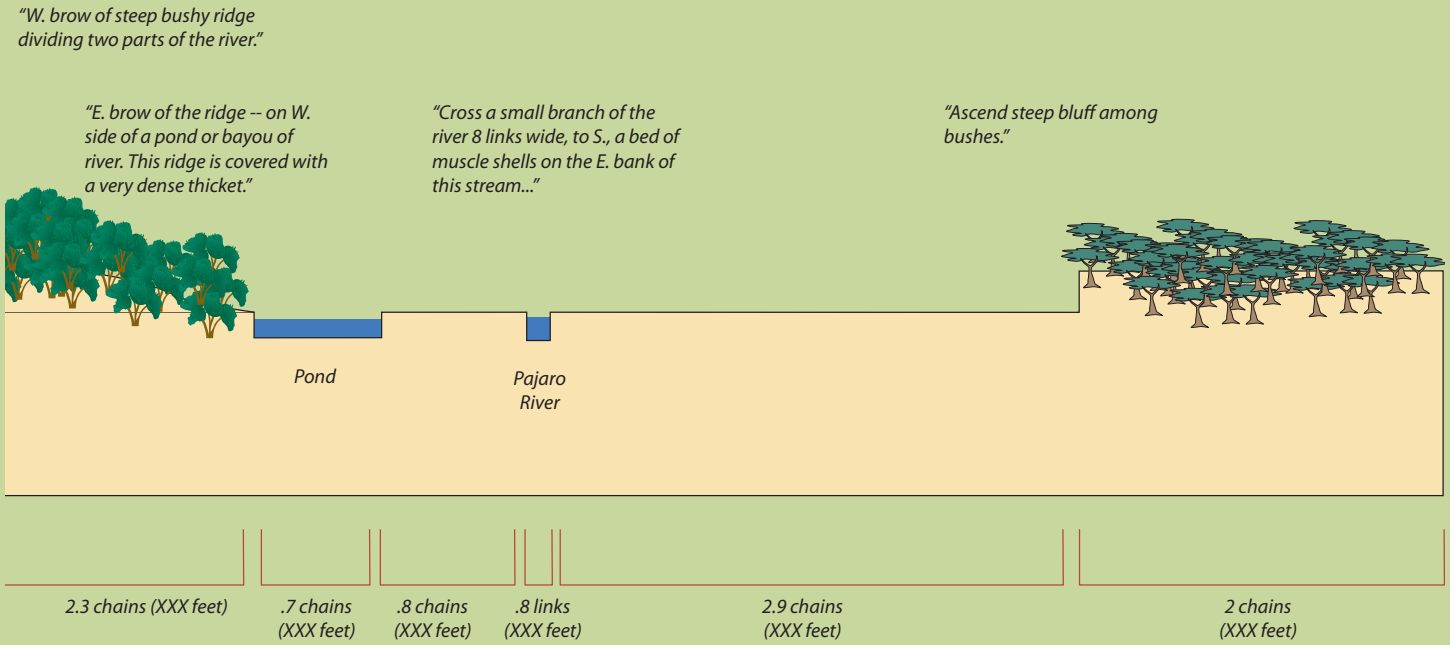
> Great quantities of silt carried in the flood discharges of these streams are deposited in the channel of the Pajaro River downstream, reducing its capacity until discharge from the upper Pajaro River clears the channel again. During the summer months, these sand bar deposits at the mouth of the San Benito River act as a control upon the water level in the Pajaro River immediately upstream.

Sargent's Station

Further upstream along the Pajaro River was Sargent's Station (or simply Sargent), located at a historical crossing of the Pajaro River (which became Monterey Road crossing). Pedro Font, traveling with the second Anza expedition in 1776, wrote that the party came up from near the mouth of the Pajaro River to cross at Sargent because the river was "somewhat miry and much more so farther down...the Páxaro [sic] River farther down is so miry that it is unfordable" (Bolton et al. 1930). Sargent was often cited as the western extent of the Soap Lake floodplain.

> *"There used to be so many flowers at Sargent that it looked like a flowery carpet. There was a lot of cebollín del campo [wild onions] and cilantro and cacomites [brodiaea]"*
>
> — ASCENCIÓN SOLORSANO, 1929

In the late 1800s, Sargent was a popular picnicking spot along the Pajaro: "half-shaded by over-reaching willows, furnishing a cool and secluded spot for boating and fishing" (Harrison ca. 1888). When the bridge across the



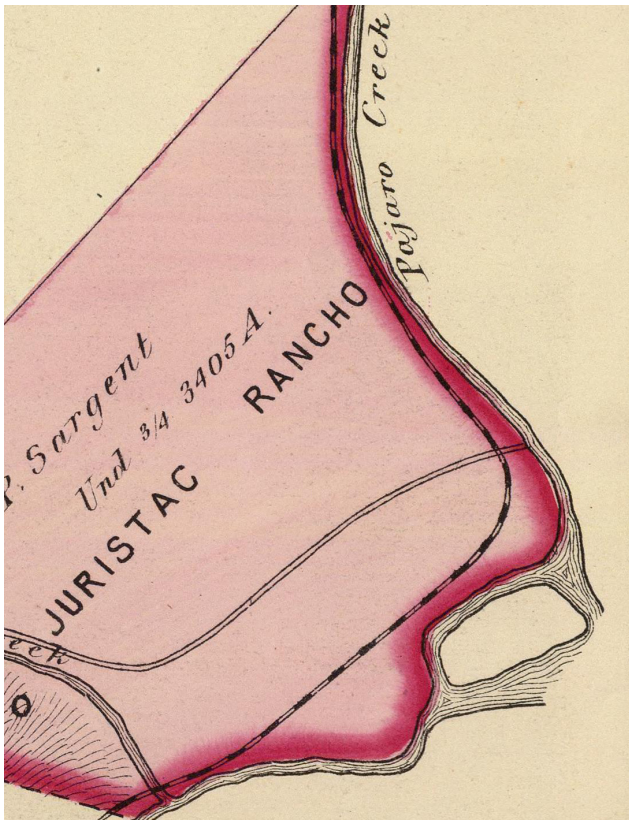


Figure 7.23. This 1876 map detail shows the island at the confluence of Pajaro "Creek" and the San Benito River. This island, and the associated pool, was the site of picnics, fishing expeditions, swimming trips, and baptisms. (Thompson and West 1876, courtesy of the David Rumsey Map Collection)

Pajaro was rebuilt and realigned in 1941, Sargent's station became inaccessible (Milliken n.d.).

San Felipe Lake-Pajaro River connection

There has been substantial interest in understanding the hydrologic connection between San Felipe Lake and the Pajaro River before the construction of Millers Canal in 1874. Fortunately, the general nature of the connection between the lake and the river, as well as a number of specific characteristics, is fairly well-documented by historical data. Geographer Broek summarized this diffuse drainage system and the adjacent constructed drainage in 1932: "the Millers Canal which, in place of the shallow winding beds which is the beginning of the Pajaro River, now affords an adequate outlet for the San Felipe Lake."

In particular, two mid 19th-century surveys described the area (see fig. 5.5). Sherman Day, Deputy Surveyor in the U.S. Surveyor General's Office, crossed the area in late June 1854, on the north-south course of a sectional boundary in the Public Land Survey. Four years and three months later, Santa Clara County surveyor Charles Healy established the Santa Clara County/San Benito County (Monterey County at the time) line. This latter survey clearly attempted to follow the hydrological connection between the Pajaro River and San Felipe Lake. A number of maps and other sources provide additional evidence.

These sources describe a series of seasonal and perennial wetland habitats that connected San Felipe Lake to the more well-defined reach of the Pajaro River which began at the Llagas Creek confluence. Morphology can be considered to have had the following sequence, from the lake to the river.

Water overflowed San Felipe Lake into a well-defined freshwater slough. The term "slough" is probably indicative of relatively broad, shallow channel geometry and wetland margins. Day's report of surface water (and use of the term "laguna") about 600 m (2,000 ft) downstream of the southwest margin of the lake in late June suggests perennial character at this end of the system. This slough is still substantially intact, apparently with largely original shape, for several thousand feet from the lake outlet. Day reported a width of about 30 m (100 ft), also similar to the present-day form.

The point at which this feature presently shifts from a sinuous to a straight alignment is very close to the location where Healy (1858a) reported that the "main slough from lake spreads out into swale." Artificial ditching was probably initiated at this point to confine flow where it naturally began to spread broadly.

There was also a secondary slough outlet from the lake noted by Healy (1858a,b), 100 m (330 ft) northwest of the main outlet. This location corresponds closely with the present-day opening to Millers Canal. It is not known exactly how the upper slough connected to the lower.

The morphology downstream was described repeatedly as a "swale" by Healy, in explicit distinction from the "sloughs." This term presumably refers to an extremely broad and shallow cross-section; he notes a swale 300 m (1,000 ft) wide at one point. Despite the diffuse shape, however, these features still are distinct in the field. Lying at the low point of the surrounding floodplain, these drainage swales were probably flooded for weeks or even months at a time in the winter. Healy's (1868) description of the area had him placing a post "in a broad island in shallow channel over which the water sheds and flows, from the lake San Felipe to the Pajaro River in the wet seasons."

> *"...a broad island in shallow channel over which the water sheds and flows, from the lake San Felipe to the Pajaro River in the wet seasons..."*
>
> — HEALY 1868

As the system turns south, the swales coalesced again into narrower, more well-defined sloughs. Heading upstream in this area (near the present day Frazier Lake Road crossing), Healy stated that "it is impossible to trace the main channel farther; the sloughs are from 30 to 80 links wide and branch out in every direction" (Healy 1868). Just downstream a "main slough" could be identified, but it was just 2 m (6 ft) deep and only 6-20 m (20-66 ft) wide (Healy 1858a). Upon reaching the confluence with Llagas Creek, Pajaro was finally considered a river, presumably because of the formative flow contributed by the Llagas Creek watershed. An early survey refers to this point as "the head of said [Pajaro] river" (Lewis 1850b). Even at this point, it is possible that the Pajaro River was still fairly shallow and broad, until finally transforming into a more substantial river south of the old Carnadero Creek confluence (near the current railroad crossing). This is suggested by the design of Millers Canal, which enters the Pajaro River just below the old Carnadero Creek confluence, indicating that this may have been the first point where water could reliably be drained into a defined channel.

Surveyor Sherman Day described this drainage as "the chain of sluggish ponds, connecting the San Felipe River [Pacheco Creek] with the Pajaro" (Day 1854). His survey line crossed one of these ponds and recorded it in detail, about 600 m (2,000 ft) west of the San Felipe Lake outlet. His notes record a "laguna" 34 m (110 ft) wide, bordered by "a salt marsh" at the "[e]dge of water on N. side."

> *"S. edge of laguna, here tending to W. This is one of the chain of sluggish ponds, connecting the San Felipe River [Pacheco Creek] with the Pajaro."*
>
> - DAY 1854

Day's observations were made on June 22, 1854, an average water year based upon San Francisco rainfall records (the only regional dataset available for that period). His use of the terms "laguna" and "ponds," as well as the extent of water in late June, suggests the presence of smaller perennial ponds and wetlands within the broader wet meadow/alkaline/seasonal wetland context. His description of a "chain" of similar features indicates that there were additional perennial freshwater ponds continuing downstream within the broad swale extending towards the Llagas/Pajaro confluence. Other than this laguna, we have no direct evidence for the amount and location of these features, but their historical presence is very probable. This is corroborated by Crespí, describing the mosaic of ponds, wetlands, and water courses that characterized the Bolsa in 1772:

> There is a positive maze of very large freshwater lakes with a great deal of swamp and bulrush patches in this hollow, and I know not how many large running streams... (Crespí [1772], in Milliken et al. 1993)

The diagrammatic feature shown by Thompson and West (1876) as a large triangle of marsh actually corresponds well to this picture (fig. 7.24). The shape coarsely matches the wet meadow area indicated by historical soils and containing the swales and sloughs described by Healy and Day. The sloughs shown along the upper boundary of the triangle generally match the alignment of Healy's swale. While the long portion of the triangle does not directly correspond to a drainage, it bounds the area with strongest wetland character (it may also be intended to represent Millers Canal, constructed just two years before).

There is some indication that the entire area connecting San Felipe Lake to the Pajaro River may have been referred to as Tequisquita Slough, implying that it was seen as a continuation of what is now known as Tequisquita Slough (and, by extension, San Felipe Lake) rather than as the uppermost part of the Pajaro River. John Gilroy (1861, in Gudde and Bright 1998) asserted that "this ditch [Tequisquita Slough] is now called the Pajaro." One map confirms this: the channel connecting San Felipe Lake to the Pajaro River is labeled "Tequesquite Slough dry in summer" (U.S. District Court, Northern District 1860; fig. 7.25).

The western Bolsa

The character of the upper Pajaro River was closely linked to the freshwater inputs from the surrounding floodplain and the aptly named Pajaro Lake. Font, traveling in March 1776, noted that the area around Pajaro River "is miry and when it rains heavily it is for the most part a lake" (Bolton and Font 1933). In severe flood years, this lake could cover the area from Gilroy to the north, Hollister to the south, Dunneville to the east and Sargent to the west:

> Mr. Tom Hawkins, when interviewed in the field, reported that in about 1910 it was possible to row a boat from Dunneville to Gilroy. (King and Hickman 1973)

> Everybody seems amazed to see rain in the middle of June, but the old Mexicans here inform us that in June of 1844, the whole country from Hollister to Gilroy was flooded with water through the heavy rains. This statement, which seems incredible, is confirmed by Mr. Julius Martin, an old American citizen of Gilroy, who came to California in 1842. (San Benito Advance 1875a)

When a road from Gilroy to Hollister was proposed in 1869, potentially to be routed by Old Gilroy, objections were raised due to the frequent flooding on the route:

> The water, or I might term it a moving lake, has been known to be between two and three miles wide, and from thee [sic] to ten feet deep on this proposed road. (Gilroy Advocate 1869a)

Broek described the area in the 1930s, emphasizing the absence of trees in the alkali meadows. His perspective of the "barren plain" may have been affected by the substantial drainage efforts and dewatering of the Bolsa by that time:

> The highly developed cultural landscape north of the tree-bordered Pajaro River finds a striking contrast in the barren plain to the south. The Valley has here expanded into a broad basin...into large tracts of salt grass pastureland. Far to the east of this grassy level, willow thickets indicate several shallow sloughs which drain into the San Felipe Lake, the principal one being Tequisquita Slough. The western portion of the Bolsa de San Felipe, as the Spanish name designates the barren central part of the plain, is practically treeless and entirely without water courses. (Broek 1932)

Author Bayard Taylor (1850) described the meadows around the Pajaro eighty years earlier (which he lyrically called "the Pajaro Plains"), giving a somewhat different perspective:

> The Pajaro Plains, around the head of the river, are finely watered, and under proper cultivation would produce splendid crops. From the ridge descending to the valley of San José we overlooked their broad expanse. The meadows were still green, and the belts of stately sycamore had not yet shed a leaf. I hailed the beautiful valley with pleasure, although its soil was more parched and arid than when I passed before, and the wild oats on the mountains rolled no longer in waves of gold. Their sides were brown and naked to desolation; the dead umber color of the

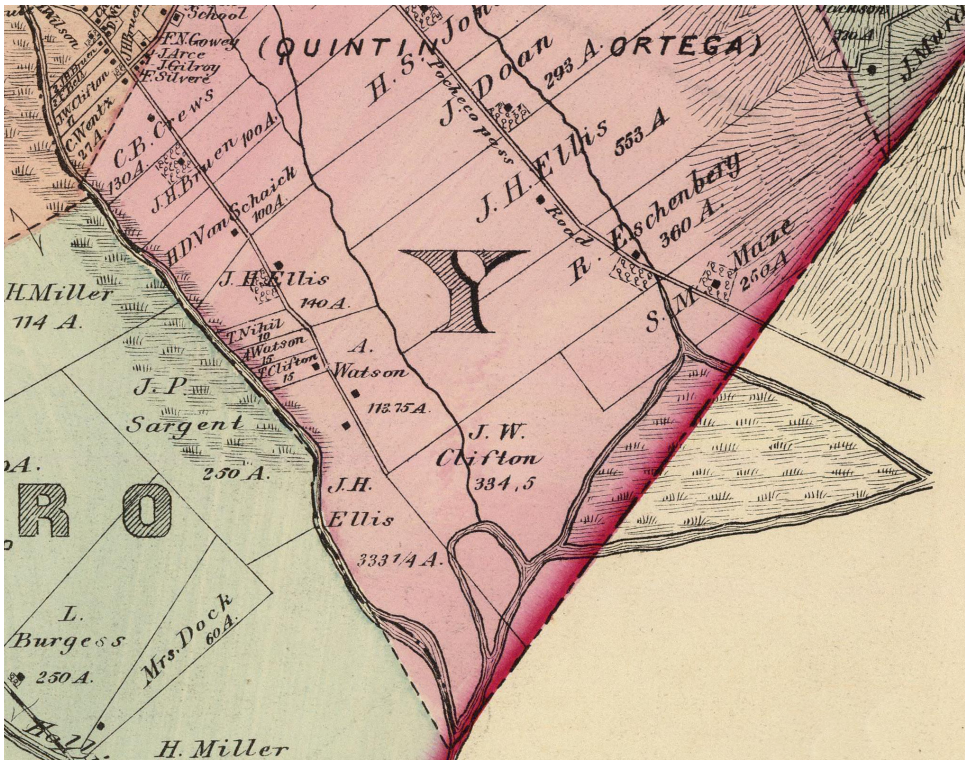


Figure 7.24. Here Thompson and West (1876) show the wetlands along lower Llagas Creek (upper left). The odd triangular array of channels surrounding marsh symbols on the right represents the drainage from San Felipe Lake to the Pajaro River. The lower channel may represent Millers Canal, completed just two years earlier. The upper channels suggest the arcing path of the natural drainage swale connecting the two systems. (Courtesy of the David Rumsey Map Collection)

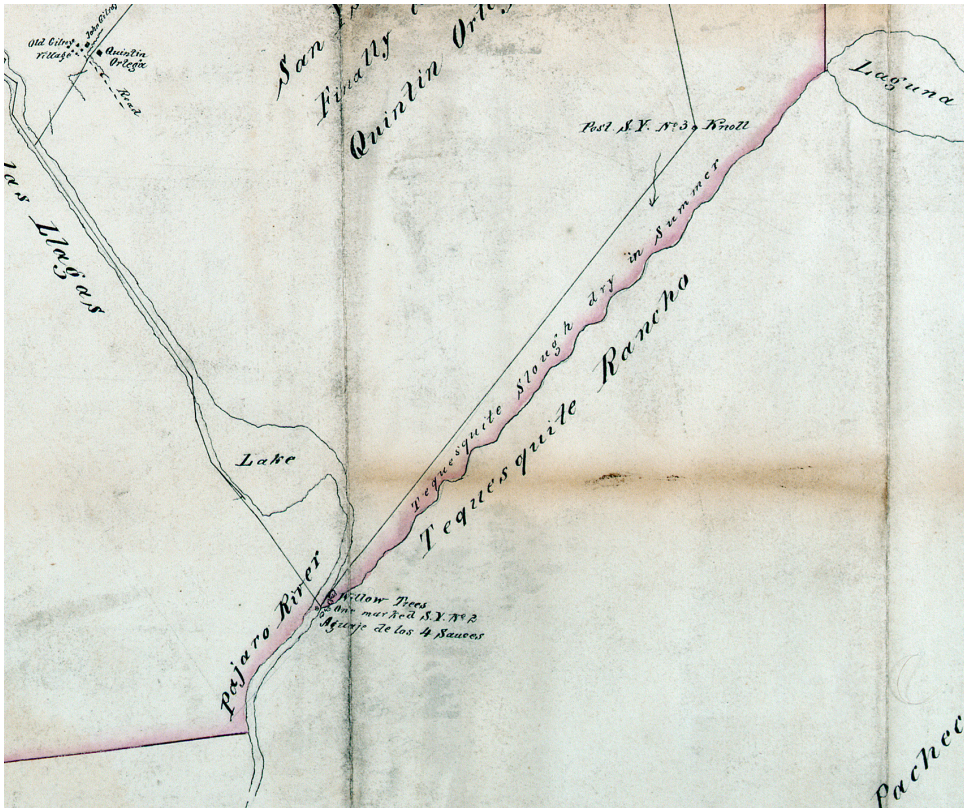


Figure 7.25. This map captures the historical relationship between San Felipe Lake ("Laguna") and the Llagas Creek-Pajaro Lake-Pajaro River system. The primary origin of the Pajaro River was clearly Llagas Creek and Pajaro Lake ("Lake"). San Felipe Lake did not overflow directly into a river channel, but into a slough that was "dry in summer." The drainage between San Felipe Lake and the upper Pajaro is here called Tequesquite Slough, which is either a naming mistake or else reflects that the feature was considered an extension of the slough of that name upstream. (U.S. District Court, Northern District 1860, courtesy of The Bancroft Library, UC Berkeley)

> landscape, towards sunset, was more cheerless than a mid-November storm. A traveler seeing California only at this season, would never be tempted to settle.
>
> As we journeyed down the valley, flocks of wild geese and brant, cleaving the air with their arrow-shaped lines, descended to their roost in the meadows. On their favorite grounds, near the head of Pajaro River, they congregated to the number of millions, hundreds of acres being in many places actually hidden under their dense ranks.

"...the Bolsa presents only a grass vegetation, mostly salt grasses..."

– BROEK 1932

The flat, poorly drained west Bolsa region, from Lomerías Muertas east to Tequisquita Slough, was defined by a predominance of alkaline soils and a near total lack of drainage. Broek (1932) called it "practically treeless and entirely without water courses"; Brewer, traveling in 1861, called it a "dead-level plain, tedious and monotonous" (Brewer [1930]1974).

The west Bolsa was largely comprised of thousands of acres of salt-affected grassland and seasonal marshland, with few water courses draining the area. These conditions were described by numerous historical sources and were the origin of the tequisquite - mineral deposits used, along with tallow, in the making of soap that led to many of the local place names (Llano de Tequisquita, Tequisquita Slough, Soap Lake). Surveys by Sherman Day affirm the alkaline, salt marsh characteristics with terms such as "salt grass," "salty plain," "salt swale," "samphire grass," and "miserable salt land" (Day 1854). One survey described the conditions of alkaline affected soils prevalent in the Bolsa as "stiff clay, mixed with much alkali inclined to be wet in winter and to bake in summer. Bears a poor grass" (Day 1854). The diary of Francisco Palou, recording the Anza expedition of 1774, referred to "patches of bad and salty land without grass or trees" when they crossed the Bolsa (Bolton et al. 1930, Brown 2005). Surface accumulations of salts and halophytic plants are still found commonly in the area.

The zone of alkali effects began in the vicinity of Lovers Lane and continued westward to the San Felipe Lake-Pajaro River drainage, affecting vast areas of seasonally wet grassland. Cosby and Watson (1927b) identify a narrow (~500 m/1,650 ft) band of soils with lesser, yet significant, alkali conditions at the eastern margin of alkali meadow, in the vicinity of Lovers Lane, west of Tequisquita Slough, and northeast of San Felipe Lake. These slightly better-drained areas were marginal to the major portion of the Bolsa, which was strongly impacted by residual salts (Cosby and Watson 1927b). The ecotone between alkali meadow and slightly higher ground even served to define the Santa Clara County boundary near Pacheco Pass Road. In the absence of other defining features, Healy's line runs "along where the weeds and mustard of the plain mingle with the salt grass and samphire [pickleweed] of the marsh" (Healy 1858a).

SAN FELIPE LAKE AND THE EASTERN BOLSA

If the western Bolsa was characterized by treeless alkaline plains, the eastern Bolsa was dominated by willows, wetlands, and watercourses. Water - artesian groundwater, the spreading of Pacheco Creek, Tequisquita Slough, and the alluvial deposits and wetland areas created by this water – defines the area.

Historical habitat patterns reflect the combination of two independent physical processes: physical gradients (soil particle size, depth to groundwater) associated with the distal end of alluvial fans plus the restricted drainage caused by the Calaveras fault (sag ponds).

Lovers Lane roughly marks the eastern margin of the great Soap Lake wetland complex, which encompassed an array of distinct wetland habitat types. East of San Felipe Road, grasslands and oak savanna followed Pacheco Creek as its coarser alluvial deposits dissipated into the Bolsa.

Tequisquita Slough and other sloughs

The two most detailed early maps of San Felipe Lake (from 1858 and 1880) clearly show the open water area of San Felipe Lake dividing into several wide sloughs extending east and southeast. While the earlier map shows these features somewhat diagrammatically, the sloughs of the 1880 map show some correspondence to later aerial imagery. (We mapped their shape and location based upon a combination of these maps and 1939/2005 aerial imagery.) The sloughs at the northeastern margin of the lake remained particularly intact. We were able to find evidence connecting almost all of the lake-margin sloughs to sloughs entering the wetland complex from the south and east.

There were at least three major sets of sloughs that entered the San Felipe wetlands complex, all from the south and east. First, Pacheco Creek spread into three smaller channels (see fig. 7.29). Second, a significant channel appears to have initiated on the valley floor south of Pacheco Creek near Dunneville. This channel may have been a former Pacheco Creek channel during recent geologic times. In the historical era, it likely intercepted groundwater and surface runoff. Last, Tequisquita Slough connected to Santa Ana Creek and Arroyo de las Víboras and approached San Felipe Lake from the south.

Some evidence of historical sloughs is still visible in 1939 aerial imagery as well as in contemporary aerial photography. These residual features often correspond closely to the alignments indicated by historical maps, helping confirm the historical data. For example, sloughs entering the Tequisquita marshes from the east apparently served as the property boundary between two farms (McCray 1907) and now persist in the form of a narrow channel following the same alignment (fig. 7.26).

Figure 7.26. Remnants of complex slough patterns from 1907 (A) still function in 2005 (B). The boundary between Brown and Gibson appears to have been a slough; that boundary is still visible today. (A: McCray 1907, courtesy of the Earth Sciences and Map Library, UC Berkeley; B: USDA 2005, courtesy of NAIP)

Freshwater wetlands and the eastern lake shore

Unlike the steeper western shore, the eastern margin of San Felipe Lake was defined by extensive perennial freshwater wetland complexes. Explorer Pedro Fages, traveling northwest along the edge of the hills northeast of San Felipe Lake in November 1770, noted "many reed patches crossed by numerous bear trails. At the place where they end there was a very large pool [San Felipe Lake], and at the head of this a village of heathen..." (Fages and Bolton 1911). Crespí came upon the area on March 23, 1772, approaching from the southeast. He captured the contrast of the flat, treeless plain with the densely forested lower reaches of streams, likely Tequisquita Slough and Pacheco Creek. Open water was more prominent in the spring than during Fages' late fall observations.

> ...we entered another broad and spacious one [plain; Santa Clara Valley], about four or more leagues wide; its longest dimension is from northwest to southeast, but its termination is not known. The land is very good, with abundant pasturage, and it has innumerable large lagoons of fresh water and three our four villages of heathen, who, by means of rafts, catch a great deal of fish in the lagoons...The valley has several arroyos of good running water, whose beds are well grown with trees—cottonwoods, alders, and willows—but on the plains not a tree is to be seen, though they are all covered with grass. (Crespí and Bolton 1927)

Historically, San Felipe Lake was often considered to include these surrounding wetlands. The Healy (1858a) survey defining the county line and the accompanying map (Healy 1858b) clearly make this point. A series of survey points refer to the "bank of lake" although the accompanying map shows the boundary following the margin of freshwater wetlands, with the "deep water" portion of the lake farther out (see fig. 5.10).

It made sense to consider these areas practically part of San Felipe Lake since they could flood dramatically during the wet season. Early landscape photographs show large areas flooded north and east of the lake, extending nearly to the hills (fig. 7.27).

> *"The land is very good, with abundant pasturage, and it has innumerable large lagoons of fresh water..."*
>
> – CRESPÍ, MARCH 1772

Perennial freshwater wetlands can nevertheless be distinguished from the open waters of the lake and more seasonal wetlands. The best evidence for the eastward extent of the perennial freshwater marsh bordering the lake comes from Herrmann's (1872) survey in which he sketches a boundary of "tule" to within about 1,000 m (3,300 ft) west of Lovers Lane. This extent corresponds generally with dark mottled soil patterns indicative of wetlands in the 1939 aerial photography. It also corresponds with the eastern boundary of Francisco Perez Pacheco's Ausaymas land grant, which apparently was defined by the margin of San Felipe Lake (U.S. District Court, Southern District [184-?] e). Other diseños (U.S. District Court, Southern District [184-?]a,e) also show the freshwater marsh on the eastern margin of San Felipe Lake parallel with the elongate willow grove to the north, corresponding with this extent (fig 7.28). The northern extent of freshwater marsh marginal to San Felipe Lake is suggested by Healy's survey fieldnotes, which report his position "3 ch left of tules [~60 m/200 ft]" along the county line.

Freshwater marsh

Between Lovers Lane and San Felipe Lake, wetland types followed a general hydrologic gradient of increasing water depth and inundation towards the lake. These radiating zones of wetland types were punctuated by springs and seeps which created an array of perennial ponds and wetlands, both associated with the Calaveras fault and scattered through the Soap Lake area. Healy (1858a,b) captures this pattern in describing the

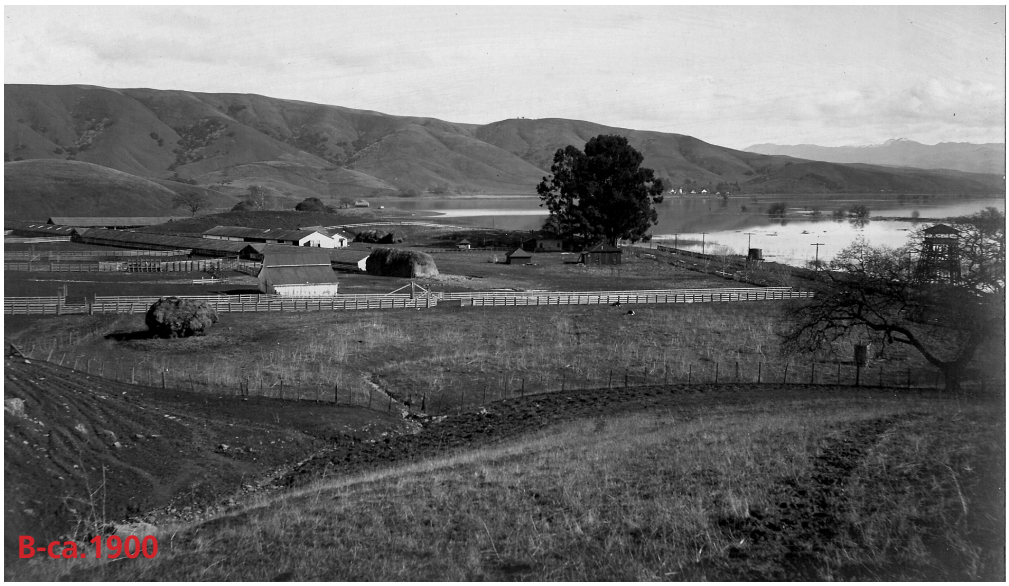


Figure 7.27. Three views of the Soap Lake floodplain from the northwest margin of San Felipe Lake. A and B were taken when the lake was in flood; submerged trees are evident. The lower image shows more average conditions, in 1894. While the image is somewhat indistinct, the white areas behind the far shore may be the sloughs and wetlands shown in 19th-century maps (see fig. 5.10). Parts of the lake's east (far) shore that are wooded today have no trees in the photograph, contributing to a picture of wetter conditions historically. (A (Unknown ca. 1900d) and B (Unknown ca. 1900e): courtesy of the San Benito County Historical Society; C: Unknown 1894b, courtesy of the Gilroy Museum)

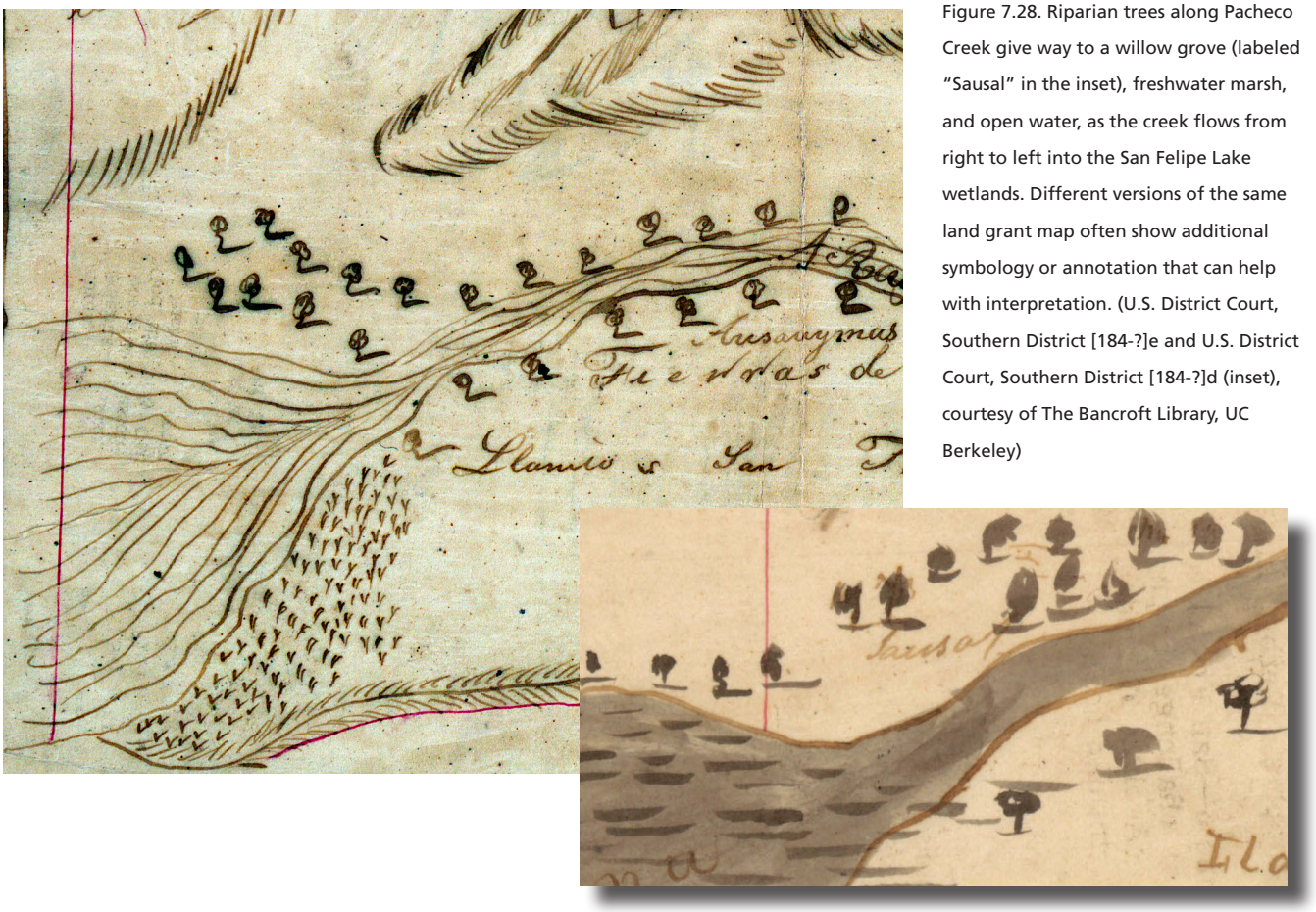


Figure 7.28. Riparian trees along Pacheco Creek give way to a willow grove (labeled "Sausal" in the inset), freshwater marsh, and open water, as the creek flows from right to left into the San Felipe Lake wetlands. Different versions of the same land grant map often show additional symbology or annotation that can help with interpretation. (U.S. District Court, Southern District [184-?]e and U.S. District Court, Southern District [184-?]d (inset), courtesy of The Bancroft Library, UC Berkeley)

general area as "tules and salt grass" (see fig. 5.10). Smaller freshwater marshes are revealed by a variety of sources, including features crossed by GLO survey lines and wetland symbols illustrated around "springs" in McCray (1907). It is likely that many more small ponds and marshes were scattered through the area than we actually show. Several larger freshwater marshes are well-documented, however (see Chapter 5).

There was a large area of valley freshwater marsh just west of Lovers Lane at Tequisquita Slough. Historically, Tequisquita Slough spread into this marshland, entering from the south. The land grant boundary between ranchos Llano de Tequisquita and Ausaymas y San Felipe, which follows the slough to this point, leaves the slough to follow a straight line northeast to the hills. Like the "mouths of Pacheco Creek" (see fig. 7.29), this point where the well-defined slough spread into more dispersed drainage system was a significant, identifiable landmark.

An extension of this wetland complex continued east across Lovers Lane to San Felipe Road, south of Pacheco Creek, occupying an interfluve of bottomland clay soils between fingers of the Pacheco Creek fan. Both this marsh and a larger marsh to the west were shown by Healy (1858b) and by the USGS (1921). Healy shows springs associated with the eastern marsh. Both features correspond at least in part to contemporary, albeit smaller, wetland features.

A large freshwater marsh is also indicated to the south by Terrell (1858), crossing Shore Road on the western side of Tequisquita Slough. A smaller slough ran through this area and was referred to as the "Tequisquita Slough overflow" as late as 1949. This area may be the "swamp"

that defined one of the borders of the Rancho Bolsa de San Felipe (Sanchez 1852).

Willow groves

Large willow groves were also found just west of Lovers Lane, well-documented by Healy (1858b) and affirmed by Cosby and Watson ("water grasses and willows"; 1927b). Healy also shows sloughs disappearing into willow swamps to the south and west; one diseño similarly shows a "Sausal" on the west side of "Sanjon del Tequisquite" where it enters the San Felipe Lake wetlands (U.S. District Court, Southern District [184-?]f). Elongate willow groves also followed the county line along the northern margin of the lake near Pacheco Pass Road. These were documented by Healy (1858b and 1880a). Portions of these remain today (see figs. 5.10 and 5.11).

One land grant map, a sketch of the Rancho Ausaymas, shows several of these features in relation to the grant boundary, confirming their presence and relative position in the 1840s (U.S. District Court, Southern District [184-?] d). It shows a "Sausal" north of San Felipe (Pacheco) Creek where it enters the San Felipe Lake marshlands, and a thinner stand of trees along the lake margin to the west. The diseños of the Rancho Llano del Tequisquita also show a distinctive woodland on Pacheco Creek's north bank as it enters the "Laguna" (U.S. District Court, Southern District [184-?]a,b; U.S. District Court, Northern District [184-?]b). A number of the groves appear to be closely associated with the margin of alkali soils.

Significant remnant stands occupy their precise historical positions on the northern margin of San Felipe Lake. The elongate willow grove sandwiched between Highway 152 and the perennial lake margin appears to have regenerated during the 20th century. While the feature was documented in both 1858 (Healy 1858b) and 1880 (Healy 1880a), two landscape photographs taken around the turn of the 20th century do not show any significant willow stands at that location (see fig. 7.27). A small stand is visible in 1939. Since then the grove has expanded substantially and resembles the historical stand.

The giant willow grove at the mouth of Pacheco Creek has been essentially completely removed and converted to a residential and agricultural landscape. However, willow trees are currently found frequently along and around Lovers Lane (see fig. 5.14) within the extent of the historical grove, suggesting the historical habitat is still viable. Willows are not a common streetside or yard tree in the surrounding areas (unless associated with drainages). For example, none are observed along San Felipe Road, the next road to the east, which was outside of the historical extent of willow groves and artesian groundwater.

PACHECO CREEK

Pacheco Creek historically underwent a series of transitions over its course, from a broad, braided, gravelly morphology above its confluence with Carmen Creek to a single thread channel in lower Pacheco Valley before dissipating into multiple channels on its alluvial fan in the eastern Bolsa (east of Lovers Lane). Originally called San Felipe Creek, Pacheco Creek was a major hydrologic input to San Felipe Lake, which Day (1854) called "the laguna of San Felipe Creek."

Spreading of Pacheco Creek

At the intersection with San Felipe Road, Pacheco Creek dissipated into several distributaries or sloughs (Healy 1858a,b) as the stream gradient flattened. This transition point in the system served as a significant landmark for the county line – the point at which the Santa Clara County line begins its course due east-west – making contemporary geolocation highly accurate. Surveys by Healy (1858b and 1880a) each explicitly show Pacheco Creek spreading out at San Felipe Road (fig. 7.29). Healy's fieldnotes reiterate the pattern, referring to "the junction of the mouths of San Felipe" and the point "near where one of the many channels or mouths of the San Felipe Creek spreads out into the lake" (Healy 1868). Discussion of the Santa Clara County boundary refers to the decision "to run a straight line... to the point where the San Felipe Creek was found to be an entire stream" (i.e., where the

single channel spread into many). The use of this feature to define an important political boundary indicates that it was well recognized and identifiable in the field, and expected to be fairly persistent.

> *Ditches have also been constructed to conduct the flood waters of the Tequisquita Slough to the lake. These measures, however, have never been sufficient to allow a higher grade of land utilization in the region and, on the other hand, there has been no inducement to construct elaborate works because of the low value of the land. Thus, Pacheco Creek still has no direct connection with the Tequisquita Slough, but terminates in the shallow channels which in turn have outlet only through a little ditch leading to an extensive swamp in the shallow depression northwest of Pacheco Corners. Only in winter do the floods from this swamp find an outlet into the Tequisquita Slough.*
>
> — BROEK 1932

Healy (1858a) recorded three large sycamores as bearing trees (1-2 m/3-5 ft in diameter) at this location, also indicating a persistent channel location. West of San Felipe Road, an array of shallow, low gradient channels distributed water across thousands of acres.

The area west of the spreading of Pacheco Creek was highly susceptible to flooding, as one family living along Pacheco Creek between San Felipe Road and Lovers Lane around 1900 found: "The John Warburtons lived...on the south side of Pacheco Creek. Every year, when the heavy rains came, the Warburtons were flooded out when the levy [sic] broke along the creek" (Williams 1968a).

In the 1940s San Benito County, Public Works engineers complained that the channel was naturally undersized for its flows:

> Pacheco Creek at this point has always been too narrow and choked with willows to carry flood crests, with the result that surrounding farm land has been flooded every few years. (Hanna 1948(?))

> This crossing [Lovers Lane] is near the outlet of Pacheco Creek into San Felipe Lake, and the creek is choked with willows and has adverse grade in places. (Hanna 1947)

These accounts describe a shallow, low gradient slough precisely at the location where it historically entered willow groves.

Pedro Fages, a Spanish explorer passing through the Bolsa and Pacheco Creek area in late November 1770, crossed what was likely the lower reach of Pacheco Creek at the eastern edge of the Bolsa on his way to find an inland route from the mission at Monterey to the San Francisco Bay (Milliken et al. 1993). He describes a "water-course thickly grown with alders, and having a very large pool of fresh water" (Fages and Bolton 1911).

The alluvial fan-wetland transition

> *"No description is adequate to cause a full realization of its tediousness"*
>
> — WILLIAM BREWER 1861, DESCRIBING THE BOLSA

From the east, Pacheco Creek's alluvial fan created a mile wide zone of well-drained soils slightly elevated above the surrounding lowlands. This naturally higher ground supported dryland habitats such as grassland and oak savanna, and defined the eastward margin of the San Felipe Lake wetlands. Geologist William Brewer described traveling from San Juan Bautista across this transition between the San Felipe lowlands and Pacheco Creek uplands in 1861:

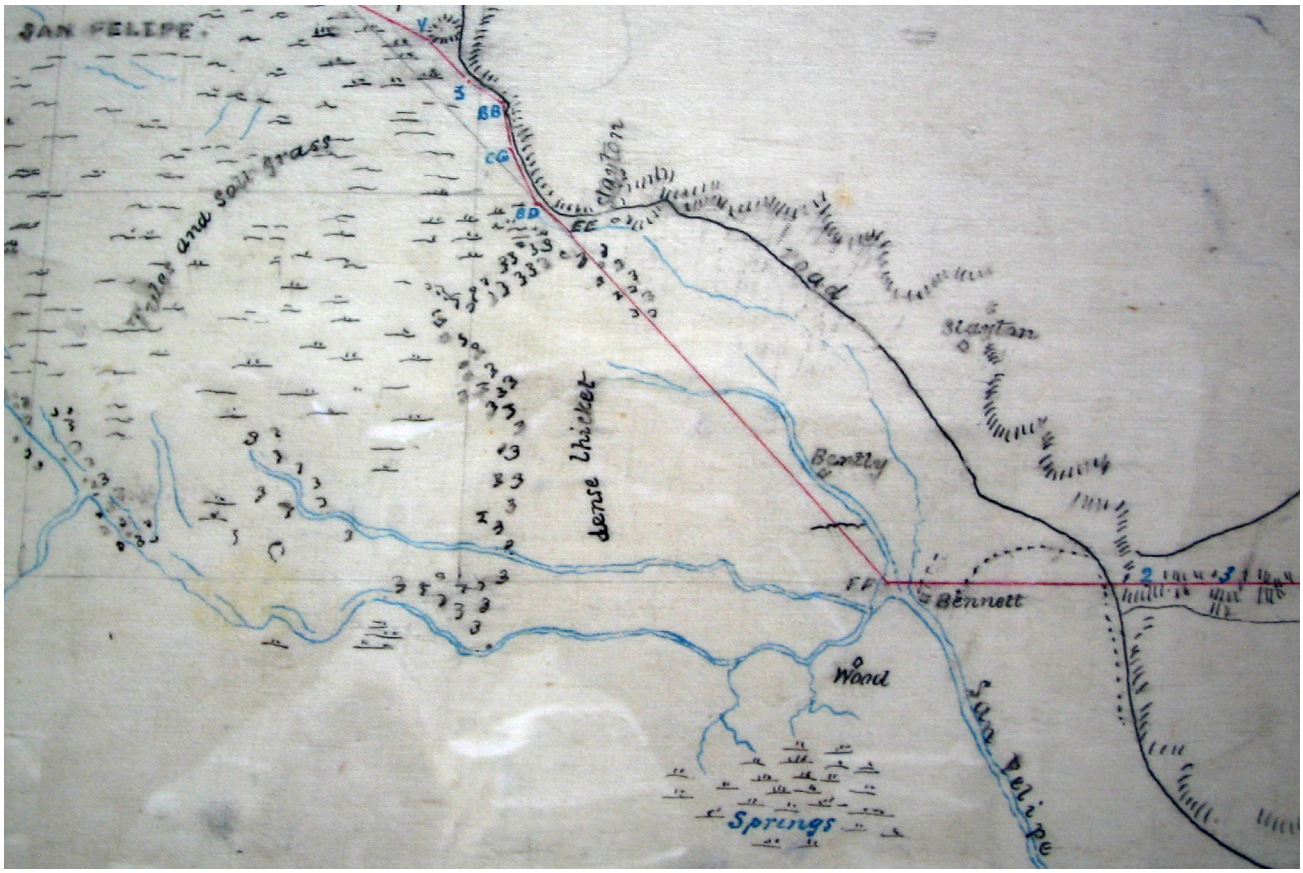
> First a ride of eighteen miles across the dead-level plain, tedious and monotonous...To one who has never tried riding on a level plain, no description is adequate to cause a full realization of its tediousness...but at last a belt of scattered oaks is entered. Then we strike up a canyon, on the Pacheco Pass... (Brewer [1930]1974)

By the early 20th century, orchards covered these prime agricultural lands. As far west as Dunneville, "Yolo silt loam and associated soils are extensively planted to orchards of prunes and other fruits, including peaches and pears" (Cosby and Watson 1927b). Yolo silt loam was considered "the most desirable soil in the Hollister area." In 1910, unimproved orchard land was valued at as much as $150 an acre (compared to $50-$80 an acre for grain land; Wells ca. 1910). Mature prune and apricot orchards were valued as high as $2,500 an acre in 1923 (Cosby and Watson 1927b).

Artesian wells and the San Felipe district

The point at which Pacheco Creek spread into multiple sloughs also closely marks the beginning of Soap Lake's artesian zone. In his study of groundwater conditions in the Santa Clara Valley, Clark (1924) mapped this boundary based on artesian or "flowing" wells existing at that time and local recollection of wells that were no longer artesian. The eastern edge of pre-modification

Figure 7.29. This portion of Healy's 1858 map of the Santa Clara County line shows the spreading of San Felipe (Pacheco) Creek into the San Felipe Lake marshlands. (The edge of "Lake San Felipe" is shown at upper left.) Healy ran the boundary, drawn in red, around the edge of the "Tules and salt grass" and then made a straight line to the point at which the creek branched, before heading due east (on the right hand side of the map). The map also shows a spring-fed marsh (lower right) and willow groves, indicated by tree symbols and the phrase "dense thicket." (Healy 1858b, courtesy of the San Benito County Recorder's Office)



artesian waters crosses through Pacheco Creek's point of distribution and generally follows San Felipe Road, a cultural landmark reflecting several significant landscape boundaries or transitions.

At San Felipe Road, the Pacheco Creek alluvial fan also spread into broad fingers (at a larger scale than the stream distributaries) as it graded into the clay-rich soils of the lowland. In between the fingers, the wetlands and alkali conditions common to the west interwove with the higher and drier fans soils, such as the springs and freshwater marsh shown by Healy (1858b) and remnant in the USGS quad (1921).

Between San Felipe Road, Lovers Lane, Pacheco Pass Road, and Shore Road, the orchards and oaks of the well-drained loams of the east transitioned to the salt-affected, wetland soils of the west. In this area the ecotone was especially ideal for agriculture and early American settlement: high-quality, well-drained soils supplied with artesian water. Yolo silt loams transitioned into Yolo fine sandy loams as only finer sediments were carried westward by diminishing stream energy. Cosby and Watson (1927b) captured this gradient, noting that while the "eastern portion" "represents an alluvial fan" at an elevation of a few feet above the valley plain, "the western portion is low and poorly drained."

This area, known as the San Felipe district of the Soap Lake area, was the "garden spot of San Benito county" (Hollister Free Lance 1886b; see Chapter 3). It was renowned for its lush appearance, its thriving orchards and dairying businesses (and later, for vegetable and seed crops).

> *"San Felipe is a conspicuous spot, because it is evergreen, and during the dry seasons presents a marked and pleasing contrast to the brown and dusty fields and hills which one sees everywhere else... It is superfluous to speak of the fertility of this soil."*
>
> – HARRISON CA. 1888

But by the west side of Lovers Lane, these same soils were affected by "injurious quantities of alkali, and support[ed] a growth of water grasses and willows" (Cosby and Watson1927b).

As a result of intensive agricultural use of this area groundwater levels plummeted in the early part of the 20th century. By 1910, the "artesian wells which flowed all year" (Anderson n.d.) around San Felipe were beginning to run dry: "some of the wells do not always flow, and the use of pumps is general" (Wells ca. 1910). The artesian boundary moved west from approximately San Felipe Road to Lovers Lane by the 1920s (likely partially as a result of extensive water use for alfalfa cultivation for dairy cattle), as the near surface groundwater was rapidly depleted by local irrigation and by drainage.

Wetlands along Pacheco Creek

Further up Pacheco Creek, near its broad U-turn into Pacheco Valley, a series of ponds, channels, and wet meadows formed near the base of the Diablo Range hills on the north and west, starting in the vicinity of the Highway 156 crossing. Extending for several kilometers downslope, this feature is revealed by a number of diverse sources including an elongate strip of poorly drained Dublin silty clay loam soils shown by Cosby and Watson (1927a,b), and remnant channels visible in 1939 aerial photography and historical maps. This feature had significance in the Mexican era, serving as a watering hole for cattle ranching (fig. 7.30). Healy (1865) referred to one of the ponds with a particularly distinct crescent shape as "Laguna," and a San Benito County survey in preparation for building the Pacheco Pass Road referred to a remnant "pond" around 1924 (California Highway Commission(?) ca. 1924). This parallel drainage to Pacheco Creek served runoff from the hills that was unable to enter Pacheco Creek because of its large natural levee, creating a continuous low area between the hills and river.

Figure 7.30. This circa late-1840s map shows a series of wetland-associated features between Pacheco Creek ("San Felipe") and the hills as the creek turns up into Pacheco Valley. An elongate poza (pool or lake) is shown, as well as large areas suitable for watering cattle (labeled "abrevadero"). (U.S. District Court, Southern District [184-?]d, courtesy of The Bancroft Library, UC Berkeley)

Single channel reach of Pacheco Creek

West of San Felipe Road, up through the valley until just south of the Carmen Creek confluence, Pacheco Creek underwent an abrupt transition. What downstream was a shallow, meandering, spreading stream became a single thread channel, narrow and fairly deep.

Herrmann (1872) records an average channel width of only 1.00 chain (20 m/66 ft) in this reach, and notes "banks steep." This is corroborated by the 1920s soil survey report for the region, which notes that below the Carmen Creek confluence, the Yolo silt loam covering the valley floor is "about 10 feet above the bed of the stream" (Cosby and Watson 1927a).

Though Pacheco Creek historically spread into several shallow, poorly defined channels west of San Felipe Road (Healy 1858a,b), by the early 1900s, the channel was fairly deep as it entered the Bolsa. Surveys, photographs, and descriptions of Pacheco Creek around San Felipe Road and Highway 156 from the early 1900s portray a wide, deep channel with ample willows and gravel bars (fig 7.31). While the creek channel alone was approximately 40 m (120 ft) wide at this point (Unknown 1924), the bank-to-bank width was much larger, with wide, gravelly bars populated with willow groves and the occasional pond.

The creek was also quite deep at this point. A circa 1920 cross-section of the creek at Highway 156 shows that the channel was approximately 6-9 m (20-28 ft) deep (California Highway Commission ca. 1924a). This is corroborated by an account from 1914 of a driver falling over the bank of Pacheco Creek at bridgeless San Felipe Road:

> at the point where the bridge had formerly been there existed on each side of the creek...a sheer drop of about twenty-five feet from the surface of the roadway to the bed of the creek... (Langdon 1920)

Later photographs of Pacheco Creek at San Felipe Road and Highway 156 also confirm this, showing bridges at both crossings wet above the level of the riparian vegetation (USACE 1973). This would support the 1920s maps showing extensive willow bars slightly above the level of the creek, with the banks high, about 6-9 m (20-30 ft), above the channel.

"There were two swimming holes; one down stream from the footbridge across the creek - this one for the boys. 'I can assure you that no boy would be caught dead in a bathing suit in that swimming hole,' Charlie said, then added that he had no idea of what went on at the girls' swimming hole up stream."

— ALTA WILLIAMS AND CHARLIE TURNER, HOLLISTER FREE LANCE 1968

There is also evidence for persistent summer pools in this reach of Pacheco Creek. There was apparently a notable pool in the vicinity of the Highway 156 crossing, where Pacheco lived, and there were popular swimming holes in the creek (one each for boys and girls) in the San Felipe area. One area resident recollects that "Pacheco's Indians lived down along the creek near the hill. There were lots of houses for the workers. There was a big pool in the creek. Mrs. Solarzano's family lived very near this pool" (Milliken n.d.).

Braided reach of Pacheco Creek

Above its confluence with Carmen Creek and below its split into north and south forks, Pacheco Creek was a broad, braided stream. The creek sometimes occupied nearly the entire valley floor with its multiple channels and broad, gravelly bars populated by sycamores and valley oaks (fig. 7.33).

One map (Winn 1915) shows the abruptness of Pacheco Creek's transition from a wider system with a narrow main channel to a single, narrow channel (see fig. 4.28).

When Santa Clara County surveyor A.T. Herrmann surveyed Pacheco Pass Road in 1872, he also recorded vegetation and creek characteristics in the valley (fig. 7.32). Herrmann noted that in many places above Carmen Creek, the stream bed dominated nearly the entire valley floor. At the upper reaches of his survey, about a mile south of the Cedar Creek confluence, Herrmann shows the creek occupying the whole valley floor, noting that the creek bed was "gravel" and "only about 10.00 [chains] [200 m/660 ft] fr base to base" (Herrmann 1872). Slightly further downstream, creek widths are recorded between 3-6 chains (about 60-120 m/200-400 ft). The creek is "very irregular, wide and washed creek bottom covers almost all ground up to base of hills" (Herrmann 1872).

Additional evidence supports this interpretation of upper Pacheco Creek. The 1927 soil survey depicts upvalley riverwash deposits indicative of a braided, multi-thread system. John Muir ([1872]1974) captured the array of habitats along the intermittent, gravelly stream as he followed the creek to Pacheco Pass in 1868:

> Through a considerable portion of the pass the road bends and mazes along the groves of a stream, or down in its pebbly bed, leading one now deep in the shadows of dogwoods and alders, then out in the light, through dry chaparral, overgreen carex meadows banked with violets and ferns, and dry, plantless flood-beds of gravel and sand.

Sherman Day crossed the creek in 1854, near where Herrmann noted a "very irregular" channel 18 years later. He noted a series branching channels, one "50 links [10 m/33 ft] wide" (Day 1854). Between that channel and another section of the channel to the north ("in channel again," Day notes), he records a "grassy bar with large sycamores," possibly the same bar shown on the soils map in this location. After a substantial distance - another 90 m (300 ft) - he recorded another

Figure 7.31. Map of bridge site at Pacheco Creek, ca. 1920. Willows populated wide, gravelly bars along Pacheco Creek, and a small pond is shown to the right. (California Highway Commission ca. 1924b, courtesy of San Benito County Public Works)

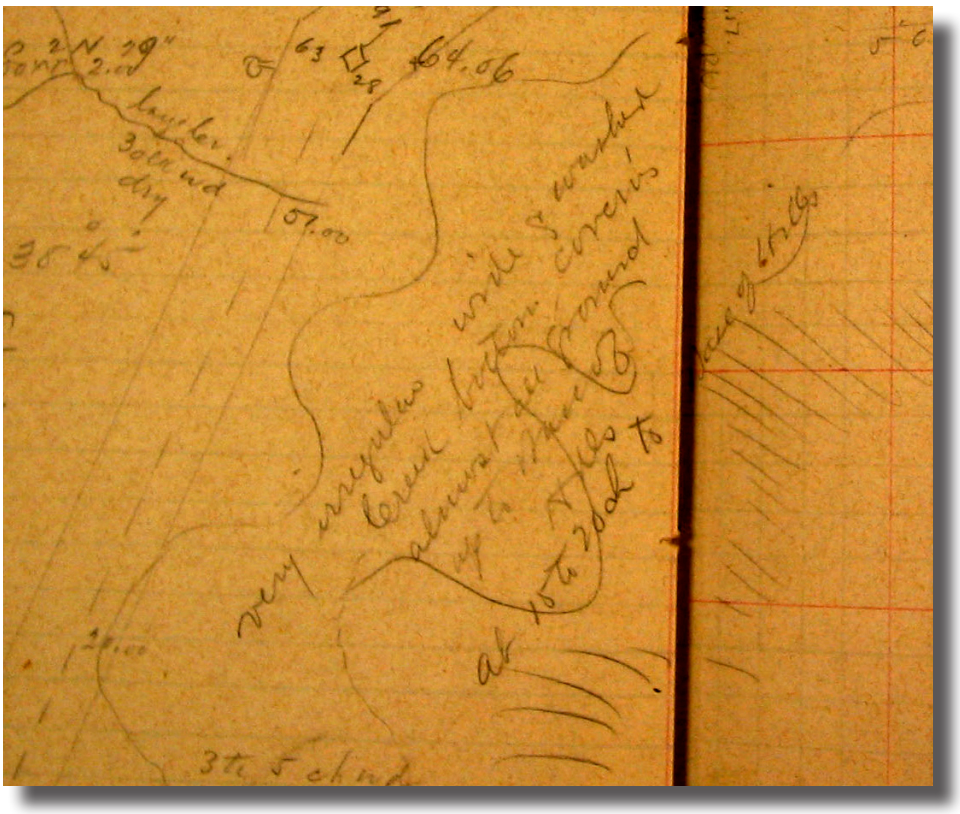


Figure 7.32. A.T. Herrmann, conducting a survey of Pacheco Pass Road in 1872, sketched upper Pacheco Creek (above Carmen Creek), and described it as: "very irregular wide and washed level bottom covers almost all ground up to base of hills." (Herrmann 1872, courtesy of the Office of the Santa Clara County Surveyor)

shallow channel: “Bank 2 feet high…Cross a bottom of rich soil through tall grass” (Day 1854). This early depiction of a series of shallow channels comprising a wide system matches Herrmann’s depiction of the creek at this spot.

Figure 7.33. Pacheco Creek at Bell’s Station, ca. 1910 (A) and rephotograph, 2008 (B). Individual sycamore trees can be seen on the creek, which runs along the base of Lovers Leap (the prominent peak at upper right). (A: Unknown ca. 1910b, courtesy of the Gilroy Museum)