COMPREHENSIVE PLAN

This Comprehensive Plan is the SFCJPA's description of our vision and action plan for the benefit of our member agencies, residents, and stakeholders for the San Francisquito watershed and floodplain. The SFCJPA has always considered a watershed approach for our work, and this document is intended to chronicle our overall plan. This plan is a living document and will be revisited annually and updated to reflect new information, recent or anticipated activities and events that affect the watershed.

San Francisquito Creek Joint Powers Authority

SAN FRANCISQUITO CREEK
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REVISION HISTORY

Revision #	Revision Date	Revisions Made
0	November 2020	Initial Plan
1	October 2021	Minor updates to project nomenclature, annual updates, and incorporation of 2021 stakeholder comments
2	March 2023	Updated to incorporate available data for the watershed, including water rights, water quality and watershed condition. Incorporated comments on public draft. Developed recommendations for future actions based on data evaluated and incorporated 2022 stakeholder comments.

ACKNOWLEDGEMENTS

This plan was prepared through a collaboration of stakeholders coordinated by the San Francisquito Creek Joint Powers Authority, the members of which are the Cities of East Palo Alto, Menlo Park and Palo Alto; the Santa Clara Valley Water District and the San Mateo County Flood and Sea Level Rise Resiliency District. We thank our reviewers for their thoughtful comments that continue to make this a better plan.

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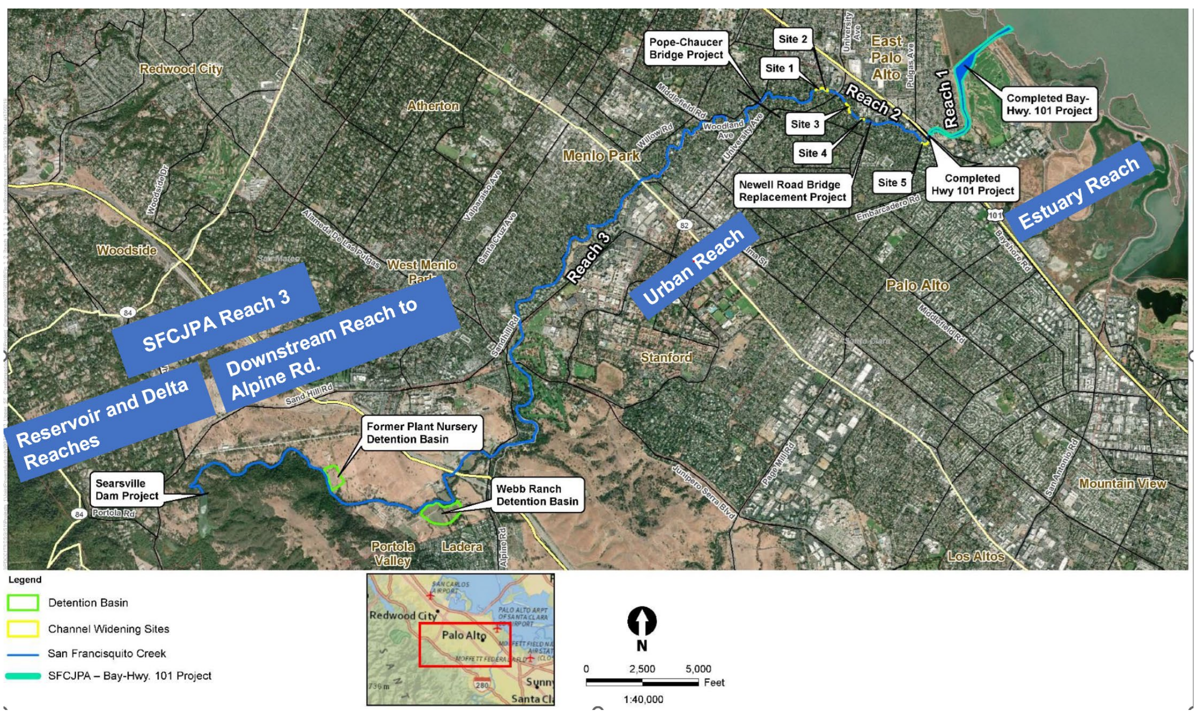
Summary

This Comprehensive Plan describes the SFCJPA's vision, goals, and action plan for the San Francisquito Watershed for the benefit of our member agencies, watershed partners and stakeholders. San Francisquito Creek is an asset unifying the communities it touches, providing ecosystem and recreation services. The San Francisquito Creek Joint Powers Authority (SFCJPA) works with its members and watershed partners to address the interrelated issues of flood protection, ecosystem restoration and creation of recreational opportunities along the creek and in the watershed.

The Comprehensive Plan is an element of San Francisquito Creek Watershed project planning. The San Francisquito Creek watershed has been studied by many different entities, and the 2022 update has incorporated known data sources as elements of a watershed plan. The existing data about the physical characteristics of the watershed may serve as baseline data forming an analytic framework for the watershed and floodplain.

Figure 1. Watershed Reaches and Projects



Our overarching goal, working with our member agencies and partners, is to implement a suite of interrelated actions, each with independent utility but together comprising a comprehensive approach with multiple benefits to all inhabitants of the watershed. The SFCJPA's action plan to achieve our vision and overarching goal is to implement the following projects that are components of the SFCJPA's plan to cost effectively provide protection to people and infrastructure, while improving habitat and recreational opportunities:

Reach 1 - San Francisco Bay to Highway 101 "Downstream Project"

This completed project was the necessary first step in our plan. The flood control aspects of the project consisted of widening the creek channel, constructing new setback levees and flood walls, and creating in-channel marsh plain. In total, this project created more than 22 acres of new and improved marsh and added new trails on top of the levees that connect to the San Francisco Bay Trail and West Bayshore Road. This project specifically incorporated protection against three feet of sea level rise. When considering the safety factor of FEMA freeboard, the project as built protects against 100-year creek flows and up to 10 feet of sea level rise compared to today's daily high tide. The Reach 1 Downstream Project flood protection elements were completed December 2018 and the overall project was completed June 2019.

Reach 2 - Highway 101 to El Camino Real "the Middle or Urban Reach Project"

This project is designed to provide protection for people and property from a flood event similar to the 1998 flood, which is considered an approximate 70-year event. This project will not provide protection from a 100-year flooding event. It will increase channel capacity at key locations. The SFCJPA submitted draft permit applications with State and Federal Fish and Wildlife agencies in July 2022 to ensure the project is designed to improve habitat and consider minimum flow depth for fish migration. The lowest flow capacity point is the Pope Chaucer Bridge, which is currently planned for replacement by a new bridge with a more open design that restores the natural creek bed resulting in an increase in the hyporheic zone in this area. Cooler water temperatures and enriched nutrients from an increase in the hyporheic zone may be beneficial for smolt out migration. The new bridge has been carefully designed to minimize its footprint and to maintain current street elevations, while ensuring safe pedestrian and bicycle access. The City of Palo Alto will be replacing the Newell Road bridge, which is considered by Caltrans to be functionally obsolete and is also a channel constriction point. Being furthest downstream, the Newell bridge replacement must happen first, and is planned for summer of 2024. Channel widening is anticipated to begin in 2024. The Pope-Chaucer bridge construction is anticipated to begin in 2025. Aging top of bank structures will be evaluated as part of a Supplemental Environmental Impact Report and may be replaced along this reach.

The project is being recalibrated based on the storms in January 2023 and the effects of Stanford's Searsville Watershed Restoration Project that was proposed February 8, 2023.

Reach 3 – "Upstream Offline Detention" to complete 100-Year Flood Protection

In order to achieve the 100-year level of protection and associated FEMA freeboard[1] to remove parcels from the FEMA floodplain (and the need to pay for flood insurance), an additional project for upstream detention was evaluated at a programmatic level in our September 2019 Environmental Impact Report.

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[1] Freeboard refers to the distance between the surface of high water and the top of the bank or floodwall. FEMA requires a certain amount of freeboard as a margin of safety.

The topography of the upper watershed does not allow for upstream detention on its own to provide 100-year flood protection; only a combination of the completed Reach 1 and Reach 2 projects, supplemented by Reach 3 offline detention and/or other similar flow reduction features can achieve 100-year protection with FEMA freeboard for San Francisquito Creek. Data collection for a project level evaluation of potential alternatives that can achieve 100-year flood protection with FEMA freeboard has been initiated. Data collection and cost evaluation will provide an understanding of the potential for upstream detention to supplement Reach 1 and 2 improvements to provide for 100-year flood protection with freeboard.

Considering climate change effects, modeling by Stanford University staff estimates that the frequency of 500-year storm events will occur three times more frequently than today. With the additional sediment loads that will occur with Stanford's proposed project at Searsville, creek flow capacity will be diminished. Upstream offline detention may offset some of this decreased capacity downstream.

Tidal flood protection and marsh restoration- Strategy to Advance Flood Protection and Ecosystem Restoration and Recreation along San Francisco Bay (SAFER Bay Project)

The Strategy to Advance Flood protection, Ecosystem restoration and Recreation Project (SAFER Bay) addresses tidal flood protection by improving or rebuilding flood protection features along San Francisco Bay within SFCJPA jurisdiction. Public Draft Feasibility reports were issued in 2016 for East Palo Alto and Menlo Park, and in 2019 for Palo Alto. The multiple reaches and elements of these projects, when fully constructed, will eliminate a key protection gap in the tidally influenced areas, along the bay margin, outside of our completed project from San Francisco Bay to Highway 101 described above.

We are currently moving forward with a portion of SAFER Bay project in East Palo Alto and Menlo Park. We have initiated early coordination with permitting agencies working on 30% designs, project description, and stakeholder outreach. The SFCJPA released a Notice of Preparation (NOP) in April 25, of 2022 and began the CEQA process. The SFCJPA will continue to work closely with the South Bay Salt Ponds Restoration Project to plan habitat restoration strategies for the former Salt Ponds R1 and R2. The SAFER Bay project will implement a combination of engineered and natural flood protection, to address tidal flooding and projected sea level rise. This project has similar protection criteria as our completed Reach 1 Creek project from San Francisco Bay to Highway 101.

The SFCJPA Board adopted the Bay Adapt Platform in December 2021 for the SAFER Bay project. This regional strategy encompasses a broad range of planning, policy, community, and project decisions to protect people, infrastructure, and natural systems, balancing local economic growth and jobs, services, housing, and recreational opportunities and is focused on local decision-making. In addition, this platform encourages projects to network across the region to better coordinate actions, share knowledge, and avoid unintended consequences or cascading effects around the Bay.

The SFCJPA has convened a SAFER Bay community advisory committee through our partnerships with Climate Resilient Communities and Nuestra Casa December 2022 and intends to continue outreach throughout design and construction.

The SFCJPA will implement the above projects as key components to achieve our vision and goals.

2023 Update Rationale and Recommendations for Action: The San Francisquito Creek watershed is changing, not only with the SFCJPA projects, but also by projects planned and implemented by others. Assessment of overall condition by Valley Water in Santa Clara County indicates generally fair conditions. Geomorphic stability evaluation completed in 2017 indicates that San Francisquito Creek is an altered urbanized creek channel that has lost much of its floodplain, and as such has higher instability and flooding potential as compared with a more natural channel. Changes at a broader scale are also occurring as a result of changing climate. This plan incorporates available baseline data that may serve as a future basis as a Watershed Plan.

The SFCJPA recommends the following actions:

- Review and incorporate 2022-23 storms into project planning.
- Increase trash removal activities.
- Develop a program for invasive species removal and remove invasive trees in the creek channel.
- Continue surface water quality monitoring and evaluate if current parameters and methods are sufficient for expected changes to watershed.
- Conduct Stream Condition Assessment for the San Mateo County side of watershed.

In addition, surface water level and groundwater pumping are monitored across different entities, and may miss watershed scale effects. Of particular interest are how flow regimes may be impacted and what those impacts mean for anadromous fish habitat in the watershed. This may be an area of future coordination and collaboration as projects move forward.

We intend to work with our member agencies and leverage other planned activities in the watershed using a partnership approach to augment our plan. As stated so eloquently in 2005, by the San Francisquito Creek Watershed Council in **A Stakeholder Vision for San Francisquito Creek**:

> *"This document offers a vision for securing the future of the San Francisquito watershed as a vital community resource. Its authors are a group of stakeholders with a range of perspectives as representatives from neighborhood associations, local cities, environmental groups, Stanford University, and local, state, and federal resource agencies. While they do not always agree on paths of action to a given goal, they put forward this vision as their collective expression of what it means to live in a watershed and keep it healthy and safe for the future."*

The SFCJPA intends to follow this tradition with our member agencies and numerous partners in a transparent and collaborative manner.

This plan will be reviewed biennially and updated as needed.

1. Introduction

This Comprehensive Plan details the past efforts and current Capital Improvement Program of the San Francisquito Creek Joint Powers Authority (SFCJPA) to document our efforts and as a communications tool. The development and refinement of the Comprehensive Plan will also provide opportunities for discussion about the issues related to flood management, ecosystem restoration, and recreational opportunities in the San Francisquito Creek watershed and floodplain and show how stakeholders throughout the watershed can work together to implement the planning goals of the SFCJPA. This document:

- describes the San Francisquito Creek Watershed and floodplain and the resources within the watershed and floodplain
- describes the evolution of the creek and floodplain and re-engineering efforts
- states accomplishments of the Planning process to date and the role of the SFCJPA,
- outlines the SFCJPA's Comprehensive Capital Improvement Program,
- describes the roles and relationships of key watershed and floodplain partners, and
- broadly outlines potential solutions and future funding needs,
- describes emerging issues and their potential impacts and opportunities.

Vision: The San Francisquito Creek and floodplain are assets enhancing and unifying the communities they touch, providing recreation and ecosystem services. The SFCJPA works with its members and watershed partners to address the interrelated issues of flood protection, ecosystem restoration and creation of recreational opportunities along the creek and floodplain, and in the watershed in a fiscally responsible manner.

Overarching Goal: Implement a suite of interrelated actions, each with independent utility but together comprising a comprehensive approach with multiple benefits to all inhabitants of the watershed and floodplain.

Action Plan: The projects described in Section 5 are components of the SFCJPA's action plan to provide 100-year flood protection, improve habitat and ecosystems, and provide recreational amenities where possible:

This Comprehensive Plan represents our path for implementing the SFCJPA's vision and tracking progress towards our overarching goal with our action plan.

This plan is intended to be a living document that will be reviewed biennially and updated as necessary. Additional information on the SFCJPA's activities can be found on our website at www.sfcjpa.org.

2. Description of the Watershed

The San Francisquito Creek watershed is approximately 45 square miles in extent and includes areas of Santa Clara and San Mateo counties. The mainstem and a portion of its Los Trancos Creek tributary form the boundary between the city of Palo Alto and the cities of Menlo Park and East Palo Alto, and between Santa Clara and San Mateo counties, reflecting the fact that it originally defined the boundary between the lands of the Spanish Missions in Santa Clara and San Francisco (Figure 1).

San Francisquito Creek is an intermittent stream that begins at the confluence of Corte Madera Creek and Bear Creek below Searsville Dam in the Jasper Ridge Biological Preserve. Perennial pools exist in the upper watershed. The creek is joined by Los Trancos Creek just northeast of Interstate 280. The creek runs approximately 14 miles from southwest to northeast, and after exiting the foothills of the Santa Cruz Mountains near Junipero Serra Boulevard and Alpine Road, flows in an incised channel within a broad historic alluvial fan before emptying into the San Francisco Bay south of the Dumbarton Bridge and north of the Palo Alto Flood Basin.

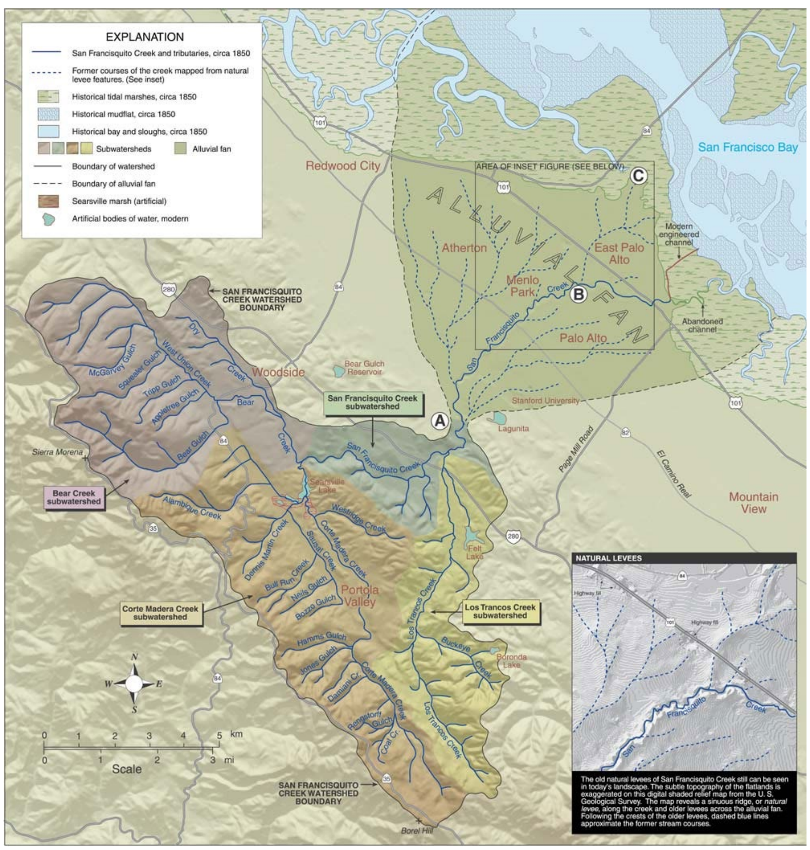

Figure 2 San Francisquito Creek Watershed and Alluvial Fan (Floodplain)

Source: Janet M. Sowers, 2004. Oakland Museum of California, Creek and Watershed Map of Palo Alto and Vicinity, ISBN 1-882140-25-7

Based on USGS surveys dating back to 1857and other historical sources, the watershed historically encompassed a more complex stream and floodplain that has been modified by human development The San Francisco Estuary Institute developed a series maps that document the natural location of floodplain elements such as willow groves, tidal marsh, and tidal channels for Reach 1 as part of Lower San Francisquito Creek Historical Ecology evaluation funded by the SFCJPA in 2009.

The SFEI noted the history of sedimentation in the lower stream reaches, where sediment aggradation was inferred. Sediment aggradation has also been noted in regional surveys of the area by Point Blue, suggesting that marshes have the potential to keep pace with some amount of rising tides (Hayden et al, 2019). SFEI also documented apparent management of sediment by local farmers in the 1920's to raise marsh levels that is of current relevance, given concerns about sea level rise, shoreline erosion and limited sediment supply.

Upstream of marshes and willow thickets, valley foothill riparian woodland habitat occurs in the watershed. Upland areas were also modified, most notably with the construction of Searsville Dam in the 1890's with associated diversions and manmade lakes and reservoirs. The creek and the associated groundwater of the San Francisquito Cone alluvial aquifer have been and are currently used for water supply.

The San Francisquito Creek Bank Stabilization Master Plan (SFCJPA 2000) noted that the following under Hydrologic and Geomorphic Conditions as key items that changed the watershed:

- Native Americans used fire to clear brush in oak woodlands and grasslands to improve hunting conditions and manage fuel loads in the San Francisquito Watershed, which would have altered vegetation cover, storm runoff, and sediment supply by soil erosion on a periodic basis.
- In the 1700's, prior to major chronic human intervention in the landscape, the creek was already deeply incised into the alluvial fan deposited during the Pleistocene based on diary accounts of Portola Expeditions.
- The introduction of cattle and sheep in the early 1800s also caused scour and chronic channel incision into alluvial sediments by reducing vegetation cover through overgrazing, increasing amount of runoff from storms and decreasing the lag time to peak flows downstream. In addition, some areas of riparian vegetation, which had previously helped to stabilize the channel and banks, were destroyed and could not regenerate. Fire was used to convert chaparral cover to grassland in the lower half of the watershed.
- Commercial logging from the 1840s to the 1880s resulted in the clearing of extensive areas of forest in the upper watershed. Settlement of the area brought residential development, scattered agriculture, and a network of roads. The cumulative effect of these landscape changes likely affected the lower portion of the watershed by further increasing peak flows and sediment yields.

As described above, the San Francisquito Creek watershed and floodplain have a long history of human use. Indigenous people managed forests and harvested salt from the shoreline areas. Large scale salt evaporator ponds were developed from tidal marsh by the 1950's, and other marsh areas were filled for farming or filled with trash and debris. Some shoreline areas were used for industrial development, marinas, and wastewater treatment.

The creek and riparian corridor, bay shoreline and associated marshes are home to several endemic and endangered species. Marshes on the edge of the bay absorb storm wave energy and dampen the impacts of high tides, providing shoreline protection against flooding. With climate change, the impacts of sea level rise will be most immediate in the floodplain areas of our communities.

Based on historical evidence, the San Francisquito Creek was likely always incised and deep, and geology and active seismic activity in the upper watershed contributed sediment via landslides (SFCJPA 2000).

Land Use

Of the approximately 27,400 acres of the San Francisquito Creek watershed, approximately 8,798 acres are protected by public agencies, property easements, or private land trusts (32%), providing a natural feel within much of the watershed. The west side of the watershed is largely unpopulated, consisting primarily of forest and grasslands. Headwaters of the watershed are in the east side of Santa Cruz Mountains, and form the Los Trancos Creek, Corte Madera Creek, and Bear Creek sub-watersheds, include forested habitats, and drain into the main stem. The lower watershed is highly urbanized and includes expansive areas of residential and commercial development. The lower watershed is highly developed when compared to the upper watershed, but some areas of open space remain interspersed throughout the urban and suburban land uses.

The watershed begins in the Santa Cruz Mountains to the west and the broad floodplain ends at the Bay to the east. The area east of Alameda de las Pulgas/Junipero Serra Boulevard is considered to be "lowlands" with a slope of less than 5%. The densest development in the region is typically located in the lowlands and includes visually similar commercial and industrial buildings as well as multi- and single-family homes. Breaks in this dense development pattern include open areas along the Bayfront, large surface parking lots, setbacks along major arterials, or local and regional parks. Development density generally decreases as elevation increases.

The steep banks of the creek in the urban portions of the watercourse have been modified or hardened in many places in response to bank erosion. Even with these modifications, the San Francisquito Creek remains one of the least modified creeks on the Peninsula and the creek retains much of its natural appearance. The creek has created its own natural 'levees'; with higher banks that slope away from the channel. The bank-tops feature many mature coastal live oak, valley oak, scrub oak, California bay laurel, and buckeye trees, while willows grow abundantly on the lower portions of the bank and in the creek channel. The heavily wooded creek banks provide a unique natural character to neighborhoods adjacent to the creek. Many residents enjoy walking or bicycling on the creek-side roads.

Several bridges cross the Creek that connect the communities of East Palo Alto, Palo Alto, and Menlo Park. Vehicular and multi-use bridges include crossings at El Camino Real, Middlefield Road, Newell Road, University Avenue, Pope Street/Chaucer Street, and East and West Bayshore Road, adjacent to the vehicular use only bridge at Highway 101. There are four public bicycle/pedestrian bridges, including the Menlo Ohlone Bridge near San Mateo Drive that connects Stanford and Menlo Park, Peninsula Bikeway Bridge off Willow Place in Menlo Park connecting to Palo Alto Avenue in Palo Alto, the Alma Street Bridge at Alma Street in Menlo Park and Palo Alto, adjacent to the one railroad bridge across San Francisquito Creek at El Palo Alto Park and the Friendship Bridge off O'Connor Street in East Palo Alto that connects to the Palo Alto Baylands. The Friendship Bridge is an important bike commute route. In addition, several properties in Palo Alto span both sides of the creek and owners have built their own private pedestrian bridges across the creek.

Demographics

Population in communities within the San Francisquito Creek Watershed is estimated in the table on the following page.

Estimated Population, San Francisquito Creek Watershed (US Census data)		
Area	Population	Year
Woodside	5,309	2020
Stanford	21,150	2020
Palo Alto	68,572	2020
East Palo Alto	30,034	2020
Menlo Park	33,780	2020
Atherton	7,188	2020
Total	**166,033**	

Residents of the San Francisquito Creek Watershed represent a wide range of socio-economic circumstances, from the wealthiest to economically disadvantaged, as well as culturally and racially diverse communities. In the SFCJPA's jurisdiction, approximately 12,700 people in East Palo Alto and 4,300 people in Menlo Park are considered vulnerable communities', as defined by the Department of Water Resources, meaning that they are highly susceptible to the impacts of flood and drought, as well as lacking the resources needed to effectively manage for water resource sustainability. Using another measure for disadvantaged community, two entire census tracts within East Palo Alto, with a combined population of over 17,000, are recognized as California Disadvantaged and Severely Disadvantaged Communities by the California Environmental Protection Agency (2017) as defined by State Bill 535. According to the U.S. Census website, the population of the cities of Menlo Park and Palo Alto tend to be both older and whiter than neighboring East Palo Alto, although a sizable percentage of Palo Alto's population is Asian. East Palo Alto's population skews younger, and more racially diverse, with a majority of Hispanic, African American and Pacific Islander residents.

The SFCJPA has and will continue to tailor community outreach to include as many stakeholders as possible. As described in Section 4, we have partnered with Nuestra Casa and Climate Resilient Communities for specific outreach for our work in disadvantaged portions of our communities. Additionally, SFCJPA can draw on the expertise of their bilingual staff members where Spanish/English or Tagalong translation or interpretation is necessary.

Historic and archeological resources[2]

The area was occupied by indigenous people for millennia prior to the first European visitors to the area in 1769. The aboriginal way of life for the Ohlone was disrupted by contact with European explorers and the establishment of missions by the Spanish in the late eighteenth century. At the time of Spanish contact, the Bay Area and the Coast Range valleys were dotted with native villages.

Gaspar de Portola crossed San Francisquito Creek in November 1769, and Spanish colonial policy throughout the late 1700s and early 1800s was directed toward establishing religious missions, presidios, and secular towns known as pueblos, with all land being held by Spain. The Stanford University campus, comprising over 8,100 acres, was once home to a large population of Muwekma-Ohlone Indians, estimated to number 10,000 individuals in small communities throughout the San Francisco Bay Area (Source: https://exhibits.stanford.edu/stanford-stories/feature/stanford-lands.

With the transition of the area to the Mexican Government in 1821, the former Spanish mission lands were divided into vast tracts called "ranchos" owned by individuals. The watershed encompasses portions of seven ranchos, two on the north side of San Francisquito Creek (Rancho Las Pulgas and Rancho Cañada de Raymundo) and five on the south side (Rancho Cañada El Corte de Madera, Rancho El Corte de Madera, Rancho San Francisquito, Rancho Rincon de San Francisquito, Rancho Rinconada del Arroyo de San Francisquito). Many of these names have come to define the geography of the watershed and its environs to this day.

After the Mexican-American War (1846-1848), the U.S. military gained control of California. The early American Period was primarily defined by the growth of agriculture in the region, with land grants establishing the towns of Menlo Park and Mayfield, and right of way for railroads. Locally, construction on the San Francisco and San Jose Railroad began in 1861, with passenger and freight service beginning in 1863. The railroad expanded the agricultural life of California and led to more innovative ways to ship and preserve food supplies, such as transporting fruit and meat in refrigerator cars which were invented

[2] ***Summarized from the 2011 report Initial Cultural Resources Investigation San Francisquito Creek Flood Damage Reduction and Ecosystem Restoration Project, Santa Clara and San Mateo Counties, California by Far Western Anthropological Research Group, Inc.***

in 1880. The railroad also facilitated the development of communities in the south Bay, a process greatly hastened by the San Francisco earthquake of 1906 which displaced hundreds of people.

Leland Stanford, Sr. purchased land along San Francisquito Creek in the late nineteenth century and established the Palo Alto Stock Farm. This land formed the basis of Stanford University, which was founded in 1885, and opened in 1891.

During the early twentieth century, population in the region expanded considerably with many marsh areas filled for farming, and San Francisquito Creek was rerouted to accommodate desired growth. Menlo Park and Palo Alto expanded, with the latter incorporating the City of Mayfield by the beginning of World War II. The general area also began to transition from rural to urbanized, with residential and commercial uses wide-spread west of Highway 101 since the 1920s. Today, the San Francisquito Creek floodplain is almost entirely developed, with many areas being redeveloped.

Creek Evolution and Re-engineering

San Francisquito Creek was modified by early European settlers who established the large Ranchos in the 1830s. These early ranchers likely constructed irrigation ditches to transport water and ford crossings at creeks.

In 1888, the Spring Valley Water Works (later "Company") began building Searsville Dam. The land where the dam and reservoir were to be belonged to Spring Valley Water Works. The dam was completed in October of 1891.

The intention of the dam was to be yet another link in the chain of lakes providing water to the city of San Francisco. However, for a number of reasons Spring Valley Water Works decided not to use the water and contracted to sell it to Stanford for irrigation. The University bought the dam and reservoir, the surrounding land and the water rights from Spring Valley Water Works in 1919.

In 1919 Stanford University took over the lake and dam from the Spring Valley Water Works Company and raised the dam 3-1/2 feet. Starting in 1922 the lake was used as a local swimming hole. Today the reservoir is nearly filled with sediment which has created wetland habitat for waterfowl, bats, and other species.

The section of creek downstream of what is now Highway 101 was first channelized and re-routed in 1931 for planned development. The area previously occupied by the creek mouth and slough is now the Palo Alto Airport and golf course. When the creek was channelized between levees it was moved north to its current alignment, which effectively moved the boundary between San Mateo and Santa Clara counties along this reach.

The Newell Road Bridge, located between Woodland Avenue (East Palo Alto) and Edgewood Drive (Palo Alto), was built in 1911. In East Palo Alto, Newell Road connects to Woodland Avenue, which provides access to University Avenue and US 101. In the City of Palo Alto, Newell Road connects to two main thoroughfares, Channing Avenue and Embarcadero Road, which also provide access to US

101. This bridge has limited hydraulic capacity and will be replaced both for traffic safety and flow conveyance.

The Pope-Chaucer bridge, which connect Pope Street in Menlo Park to Chaucer Street in Palo Alto, was originally a wooden structure built in 1907, and soon thereafter was replaced by a concrete bridge in the same location. In 1948, the bridge deck was expanded and the existing culvert that was added under the existing bridge. A right turn lane on the expanded bridge deck was abandoned in the 1980s and oak trees were planted in the soil between the culvert and former road surface.

At least two efforts were initiated in the 1950s and 1960s, partially in response to the 1955 flood, to straighten and channelize the creek from Middlefield Road to San Francisco Bay. The plans were abandoned for several reasons, including the difficulty in acquiring needed land rights and community opposition.

Ownership

The San Francisquito Creek Watershed creek is owned by many different entities that vary by creek reach. A summary of land ownership was developed as part of the SFCJPA Bank Stabilization Master Plan (Figure 2).

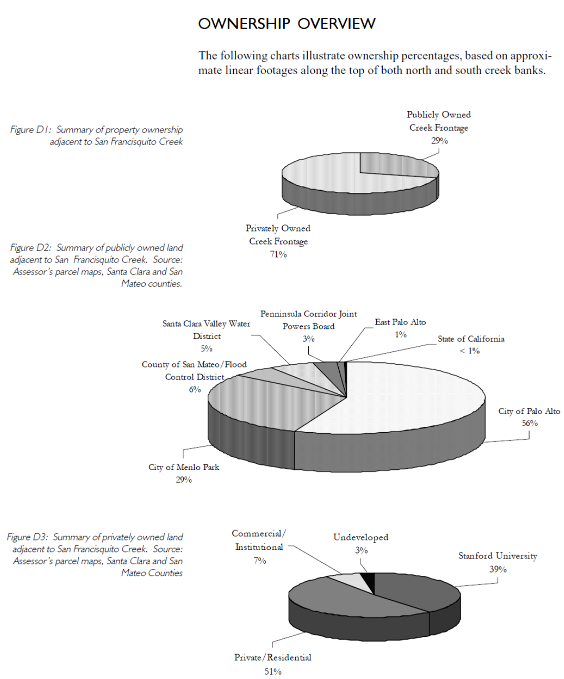

Figure 3 Creek Ownership Overview

Recreation

The San Francisquito Creek watershed and floodplain supports a wide range of local and regional parks, trails, and open spaces. The Creek flows into Don Edwards National Wildlife Refuge and Baylands Nature Preserve, a 1,940-acre tract of marshland (the largest remaining marshland in the San Francisco Bay) with high-quality marsh habitat. The creek runs adjacent to the Palo Alto Municipal Golf Course and Palo Alto's Baylands Athletic Center. The Creek corridor also supports a portion of the regional Bay Trail and connects to Cooley Landing Park and the Ravenswood Open Space Preserve to the north in East Palo Alto and Palo Alto Baylands Nature Preserve to the south in Palo Alto. The San Francisquito Creek Trail is well traveled and is the location of many community events, including Moonlight Run, Great Race for Saving Water and Bay Day. Figure 3 shows parks and open space within the Watershed and along the shoreline.

Note that Jasper Ridge Biological Preserve is neither a park nor open space. It is mostly zoned residential and is an academic facility owned and operated by Stanford.

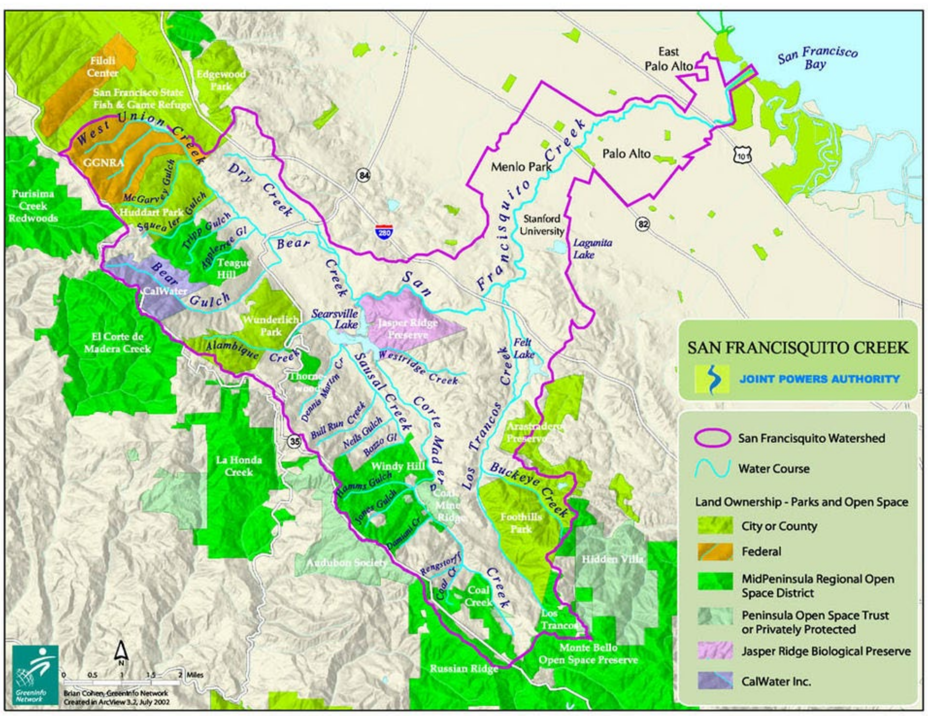

Figure 4 Parks and Open space in San Francisquito Creek Watershed

The Urban reach of the Creek between Highway 101 and Interstate 280 is features urban parks and trails such as Hopkins Creekside Park and El Palo Alto Park, transitioning to a wide range of larger parks and open space further west on Stanford University lands and in the surrounding foothills.

Utilities

As San Francisquito Creek runs through the urban environment, multiple utility corridors run adjacent to or over the creek. The relocation, protection, or avoidance of these utilities have a significant impact on work in or around the creek.

The typical utilities are expected to cross San Francisquito Creek at major road crossings. In addition, there are major known utilities spanning over or adjacent to the creek. Significant utilities include:

- Pacific Gas & Electric substations and high-tension overhead electric lines and high-pressure gas transmission lines are within an easement adjacent to and across the channel downstream of Highway 101.
- Sanitary sewer, water service, and surface water drainage conduit occur beneath Woodland Avenue, while overhead electric lines occur adjacent to Woodland Avenue.
- Caltrain trestle and tracks cross over the creek, adjacent to the El Palo Alto Park, near Alma Avenue.

Along the Bay shoreline of Menlo Park and East Palo Alto, critical utilities, include:

- PG&E natural gas pipelines, electrical sub-stations, transmission and distribution lines,
- San Francisco Public Utilities Commission (SFPUC) drinking water supply aqueducts,
- Eastern Sanitary District wastewater conveyance systems
- Stormwater pump stations and tide gates (add locations)
- The CalTrans Highway 84 Western Dumbarton Bridge approach

Sea level rise and storm events may adversely impact these utilities.

The SFCJPA will continue to coordinate closely with PG&E, local and State districts and municipal departments in the planning and implementation of our projects to ensure these critical infrastructure resources are considered during project planning and safeguarded.

Fish and Wildlife resources

San Francisquito Creek flows through a mix of protected open space, agricultural, commercial, light industrial, and residential settings before reaching the baylands habitat associated with South San Francisco Bay. At the bottom of the watershed, where the creek meets the San Francisco Bay, is salt marsh habitat. The salt marsh harvest mouse, Ridgway's Rail, and black rail, have all been observed in this vicinity. Moving upstream and west through the watershed, as water becomes less tidally influenced and salinity levels decrease, riparian corridors of perennial water, stream-side vegetation such as willows, box alders, and cattails, are present along many of the streams throughout the watershed.

These areas provide suitable habitat for the California red-legged frog, California tiger salamander, and western pond turtle, which have all been observed within the watershed. The National Marine Fisheries Services has designated San Francisquito Creek downstream of Searsville Dam as Critical Habitat for steelhead.

Additionally, streams within the Bear Creek, San Francisquito Creek and Los Trancos Creek watersheds provide suitable migration and spawning habitat for steelhead. Serpentine soil outcrops have been identified within the San Francisquito, Corte Madera, Bear, and West Union Creek sub- watersheds. This micro-habitat supports special status and common wildlife and plant species, including the Bay checkerspot butterfly, serpentine bunchgrass, and Crystal Springs lessingia.

Climate and Climate Change

The Bay Area has a Mediterranean climate with mild wet winters and warm dry summers. Coastal ocean currents moderate the effects of seasonal changes in temperature. The Santa Cruz Mountains impose a moderate rain-shadow (or orographic) effect to their east in the San Francisquito Creek watershed. This orographic effect contributes to variability in average annual precipitation in the watershed, ranging from about 40 inches at the crest of the mountains to approximately 15 inches in Palo Alto.

In the past century, global mean sea level has increased by 7 to 8 inches with human influence the dominant cause of observed atmospheric and oceanic warming. Given current trends in greenhouse gas emissions and increasing global temperatures, sea level rise is expected to accelerate in the coming decades, with scientists projecting as much as a 66-inch increase in sea level along segments of California's coast by the year 2100. While over the next few decades, the most damaging events are likely to be dominated by large El Niño - driven storm events in combination with high tides and large waves, impacts will generally become more frequent and more severe in the latter half of this century (https://www.coastal.ca.gov/climate/slr/).

The California Coastal Commission states that sea level rise in California will affect almost every facet of our natural and built environments. Natural flooding, erosion, and storm event patterns are likely to be exacerbated by sea level rise, leading to significant social, environmental, and economic impacts. Guidance from the California Ocean Protection Council and the San Francisco Bay Conservation and Development Commission (BCDC) recommend that new projects along the San Francisco Bay shoreline incorporate three and ½ feet of sea level rise (BCDC 2020).

Sea level rise along the bay margin will have an impact on ground water aquifers as saline or brackish water intrudes inland along with rising sea levels. This salt-water intrusion may compromise wells presently used for drinking or irrigation water. Rising ground water tables at the bay margin may also adversely impact the built and landscaped environment where subsurface excavations or construction encounter groundwater.

Climate change will also impact the San Francisquito Creek watershed. As temperatures increase, this will raise the rate of evapotranspiration in watershed vegetation and soils. This will tend to decrease the amount of water retained in the soil and watershed vegetation, potentially leading to lower creek flows, and lower groundwater tables, loss of trees, vegetation and changes in the ecosystem that will reduce the creeks ability to absorb runoff and thus increase flows and flooding. Additionally, warmer and dryer conditions are conducive to greater fire risks, and to hotter, faster-burning fires, when they occur. Fires in the heavily vegetated areas of the higher elevations of the San Francisquito watershed could have significant negative impacts on habitat and both water quantity, and water quality in the watershed.

Changing heat and moisture regimes open new ecological niches for plants and animals not formerly associated with the watershed. New species may be benign, or they may disrupt ecosystems, such as with forest damaging diseases or insects. Species disruptions may also increase the risk of fire, as existing vegetation regimes succumb to disease.

UPDATED CLIMATE CHANGE MODELING 2022

The SFCJPA collaborated on a study with Stanford University staff on hydraulic modeling of San Francisquito Creek (https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/734076). The study used the existing watershed level HEC-RAS and sediment transport models and modified them to three separate probabilistic predictions of flows under the following three transects:

1) upstream of the Middlefield Road Bridge,
2) between the Middlefield Road Bridge and the Pope-Chaucer Bridge, and
3) downstream of the Pope-Chaucer Bridge.

Thirty centimeters of sea level rise were included, and a 50% increase in precipitation was simulated by increases in river discharge. The study used the output from HEC-RAS at transects within the above three locations to evaluate outflow over modeled hydraulic structures (levees, floodwalls) to predict flooding. The probabilistic modeling was completed for four potential future climate conditions-present-day, increased discharge, increased sea level, increased discharge and sea level, and across each of the three creek conditions: Baseline, Infrastructure, and Infrastructure + Sedimentation.

Results indicate that the probability of a 1% (100-year) flood becomes approximately two and one half times (2.5x) more frequent. Very high flood events, a 500-year flood (0.4%) may occur almost three times more frequently in the future. The simulations also predict that in the future, there is an increased probability of breakout at the University Avenue Bridge. The sedimentation simulations indicate increased probability of sediment accumulation near Highway 101 that if not managed as planned, could cause flooding from San Francisquito Creek.

The SFCJPA has and will continue to consider foreseeable impacts and changing priorities due to climate change in project planning and implementation. The SFCJPA cannot transfer risks from one area to another so will evaluate each project to ensure that the design does not result in unintended consequences locally or regionally.

Geology

San Francisquito Creek flows out of the Santa Cruz Mountains and onto a coalesced alluvial fan or apron near Junipero Serra Boulevard. The creek has deeply incised the alluvial fan sediments along much of its course, leaving steep banks that are often 25 feet high. A geological profile along San Francisquito Creek, downstream from Alameda de Las Pulgas Road/Junipero Serra Boulevard, shows a layer of coarse channel bed material (gravel, cobbles, and boulders) as far downstream as Middlefield Road. The coarse bed surface present was formed through a winnowing of finer sediment; the underlying subsurface material appears to be considerably finer.

The area is tectonically active, and this has affected the shape and form of the San Francisquito Watershed. Four major northwest-southeast trending faults occur within the Watershed that are associated with the San Andreas Fault System. The Pilarcitos Fault forms the drainage divide to the southwest, and a similar cluster of faults trend along West Union Creek. The Santa Cruz Mountains were formed by uplift along these faults and define the upper limit of the watershed. Just west of Interstate 280, the elongated portion of the watershed follows the San Andreas Fault System—creating an overall T-shape oriented in a northwestern-southeasterly manner, closely following the fault system.

Geology also ultimately controls the type and composition of sediments and in the Watershed. In particular, the Franciscan Complex at Jasper Ridge and Searsville formed by metamorphosed marine sediments is highly erodible and characteristic in composition. Other bedrock in the upper watershed are the Whiskey Hill, Ladera Sandstone, and Santa Clara formations that are generally sandstones (SLAC 2006).

The October 1891 completion of Searsville Dam on Corte Madera Creek, and subsequent reduction of coarse sediment supply while peak flows were maintained, is thought to be a contributing factor to formation of the bed surface. The coarse sediments overlie a sandy deposit that continues in the streambed to downstream from Highway 101 to the Palo Alto Municipal Golf Course. A thick layer of bay sediments with lenses of alluvium extends at depth beneath the sand upstream to about where the San Francisquito Creek passes the Stanford University Campus, forming a shallow aquifer beneath the fan. These bay sediments are underlain at depth by older, more consolidated alluvium and bedrock.

Soils

The soils along lower San Francisquito Creek are relatively young. These soils are composed of fine particles (e.g., silt, clay) that were transported as suspended sediment derived from upstream sources and deposited overbank during flood events. The texture and characteristics of these soils affect how quickly water can infiltrate the ground surface. As a result, the soil is important for determining the volume of storm runoff, its timing, and its peak rate of flow.

Groundwater and Land Subsidence

Groundwater and surface water are hydraulically connected in the San Francisquito Creek Watershed (San Mateo County 2018). The USGS defined the unconsolidated sediments as the "San Francisquito Cone Alluvial Aquifer" in 1997.This aquifer is the most productive unit in the San Mateo Plain Groundwater Basin (San Mateo County 2018).

The San Francisquito Cone Alluvial Aquifer is used as a potable supply source by Palo Alto Park Mutual Water Company and O'Connor Tract Cooperative Water Company to supply portions of East Palo Alto Menlo Park. The aquifer is also an emergency supply source for City of Palo Alto, City of Menlo Park and Stanford University. There are also many private wells in the San Francisquito Cone alluvial aquifer that are primarily used for irrigation, including San Mateo County Parks, residents in Atherton, Saint Patrick's Seminary, Holbrook Palmer Park and Stanford University. Consumptive groundwater use from riparian vegetation along San Francisquito Creek from Junipero Serra Road to Highway 101 was estimated to be about 82 acre feet per year (San Mateo County 2018).

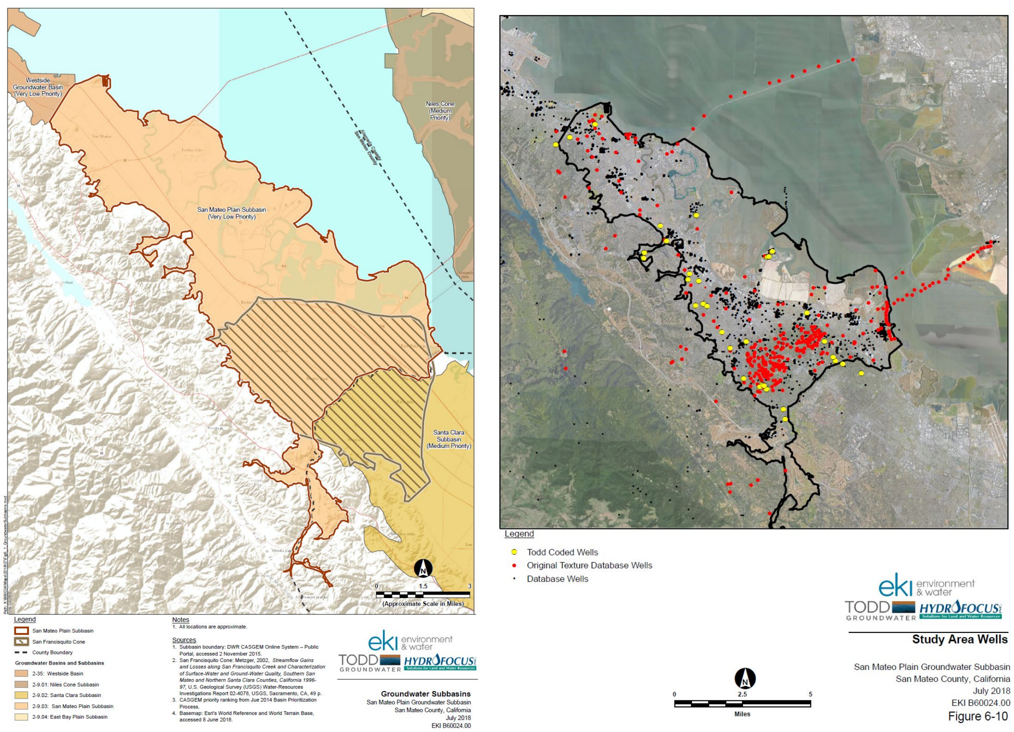

Figure 5. Location of San Francisquito Cone Alluvial Aquifer and Wells (San Mateo County 2018)

Groundwater pumping (not including five Stanford wells located near San Francisquito Creek) was estimated to be 2,300 acre feet per year (San Mateo County Groundwater Assessment 2018). Stanford's groundwater use from the five wells between 2010 and 2015 averaged 584 acre feet per year (Stanford Water Supply Assessment, 2017). Stanford uses groundwater wells to supplement surface water diversions from the San Francisquito Creek watershed for use as irrigation water supply. As mentioned above, the wells also serve as emergency potable water supply to the campus in the event of disruption in the supply of potable water from SFPUC (source: https://suwater.stanford.edu/water-supplies/groundwater).

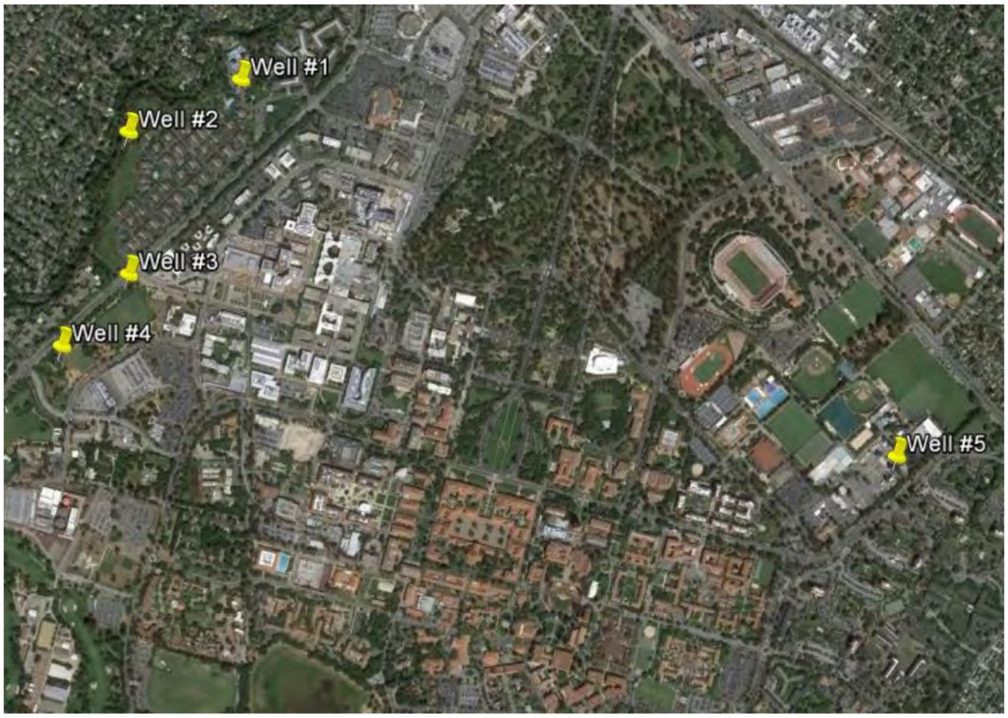

Figure 6. Location of Stanford Wells, Stanford Water Supply Assessment, 2017.

Groundwater use in the area is currently considered to be balanced, meaning that withdrawals approximately equal recharge (San Mateo County 2018). However, historical overdraft (defined as long-term pumping that exceeds recharge) from groundwater pumping in the San Francisquito Cone alluvial aquifer at 6,000 to 7,500 acre feet per year (AFY) resulted in historical localized land subsidence and salinity intrusion. San Mateo County Office of Sustainability funded a groundwater monitoring plan and two years of monitoring following the 2018 groundwater assessment. San Mateo County has renewed the contract to continue this work for the next several years.

Regional groundwater levels had been trending upward until the most recent drought. This is because surface water and groundwater in the San Francisquito Watershed are directly hydraulically connected, and groundwater pumping in the San Francisquito Cone Alluvial Aquifer in Santa Clara and San Mateo Counties cannot be considered independently (San Mateo County 2018).

Regulatory Status of Creek and Watershed

The creek is listed by the State Water Board under the 303(d) list as impaired for Diazinon, sedimentation/siltation, and trash. Placement of a water body and its offending pollutant(s) on the 303(d) list, initiates the development of a Total maximum Daily Load (TMDL). TMDLs may establish “daily load” limits of the pollutant, or in some cases require other regulatory measures, with the ultimate goal of reducing the amount of the pollutant entering the water body to meet water quality standards.

The San Francisco Bay Basin Plan (San Francisco Bay Regional Water Quality Control Board 2015) describes beneficial uses for the waters in San Francisco Bay. Beneficial uses represent the services and qualities of a water body (i.e., the reasons the water body is considered valuable). Beneficial uses of San Francisquito Creek are listed below:

- Cold Freshwater Habitat (COLD); Fish Migration (MGR)
- Preservation of Rare and Endangered Species (RARE)
- Fish Spawning (SPWN)
- Warm Freshwater Habitat (WARM)
- Wildlife Habitat (WILD)
- Water Contact Recreation (REC-1)
- Noncontact Water Recreation (REC-2)

Other federal, California and local regulatory authorities governing actions that the SFCJPA may take include regulations promulgated by US Fish and Wildlife Service, National Marine Fisheries Service, National Park Service, California Office of Historic Preservation, Bay Conservation and Development Commission, California Department of Fish and Wildlife as well as local plans and ordinances from the relevant cities and counties. These requirements and others are described in environmental documentation for our projects as well as our Operations and Maintenance Manual for completed work.

The California Department of Water Resources has designated two groundwater Basins, one on each side of the creek, that are also directly hydraulically connected in the watershed. In San Mateo County, it is Groundwater Basin 2-009.03 Santa Clara Valley- San Mateo Plain, and on the Santa Clara County side of the Creek, it is Groundwater Basin 2-009.02 Santa Clara Valley- Santa Clara Sub-basin (Department of Water Resources Bulletin 118, Groundwater Basins, 2021). The Sustainable Groundwater Management Act has classified the Santa Clara side as very high priority and the San Mateo side as very low priority (DWR Basin Prioritization 2021). As noted above, this designation across political boundaries and may not make sense for management of San Francisquito Cone Alluvial Aquifer (San Mateo County 2018). In 2015 several local entities approved resolutions to sustainably manage groundwater in the San Francisquito Cone Alluvial aquifer, including the Cities of Menlo Park, Palo Alto, East Palo Alto, Santa Clara Valley Water District, Town of Portola Valley, and San Mateo County (Byler *et al* 2015).

Surface Water and Water Rights

Tributaries that feed into San Francisquito Creek include Bear Creek, Los Trancos Creek, Alambique Creek, Dennis Martin Creek, Sausal Creek, and Corte Madera Creek (See Figure 1). San Francisquito

Creek itself begins at the confluence of Bear and Corte Madera creeks in the upper watershed and continues to San Francisco Bay.

There are four manmade lakes located within in the San Francisquito Creek watershed, three of which are on Stanford lands that are primarily used for water storage: Searsville Lake, Felt Lake, and Lake Lagunita. Lake Lagunita does not hold water and recharges groundwater. Boronda Lake is within the City of Palo Alto Foothills Nature Preserve and is used for recreation.

Stanford reservoirs diverted creek surface waters providing approximately 1,250 Acre Feet per Year (1.12 million gallons per day) to Stanford's lake water system (Stanford Water Supply Assessment, 2017). Lake Lagunita is not a water storage facility, as water recharges the aquifer in this area and is preserved for conservation purposes. In 2019, Stanford removed the diversion dam from San Francisquito Creek (https://news.stanford.edu/2019/02/27/stanford-removes-lagunita-diversion-dam/).

A fifth reservoir is located just outside the watershed, Bear Gulch Reservoir, but is fed by water from diverted from two dams on Bear Creek. This reservoir is the main storage for the Bear Gulch District of the California Water Service, holding up to 215 million gallons (about 660 acre feet) of water, serving the towns of Portola Valley, Woodside, and Atherton, and portions of the Cities of Menlo Park and Redwood City.

Based on water rights reported in the California Water Resources Control Board Water Rights Electronic Water Rights Management System (eWRIMS) Report Management System, the following is a summary of active diversions and water rights in the San Francisquito Creek Watershed:

Water right owner	Source
LELAND STANFORD JR UNIVERSITY	San Francisquito Creek and Los Trancos Creek
CALIF WATER SERVICE COMPANY	San Francisquito Creek and Bear Gulch Creek
SKY L'ONDA MUTUAL WATER COMPANY	Bear Gulch Creek
ANCILE LLC	El Corte de Madera Creek

The largest water rights in the Watershed (Stanford University and California Water Service/Sky L'onda Mutual Water Company) are described below.

Stanford:

Stanford's 2017 Water Supply Assessment describes the following water rights:

Stanford holds a combination of riparian and pre-1914 appropriative rights reported under four Statements of Water Diversion and Use (S004660, S004661, S015695, S015696) and one appropriative right licensed by the SWRCB (L001723). These water rights support Stanford's diversion operations from Corte Madera, Los Trancos Creek and San Francisquito Creek, streams that flow through Stanford lands, which supply Stanford's non-potable Lake Water system. These appropriative water rights date to 1886, 1870, and 1891, and the licensed right was issued in 1937. The rights provide water for recreation, irrigation, stock watering, and fire protection purposes, and are summarized as follows:

- License 1723 authorizes diversion of up to 900 AFY from Los Trancos Creek and/or the San Francisquito Creek pump station, from December 1 to May 1, to storage in Felt Reservoir, which has a storage capacity of 1,050 acre-feet.
- Statements S015695 and S015696 document pre-1914 appropriative water rights to divert from those same diversion facilities to storage in Felt Reservoir.
- Statement S004660 documents Stanford's pre-1914 appropriative right to impound, divert and store water in Searsville Reservoir (Searsville Reservoir storage capacity has been reduced over time by sedimentation, but this pre-1914 appropriative water right has been exercised downstream at the San Francisquito Creek pump station).
- Statement S004661 authorizes the diversion of water from San Francisquito Creek to Lagunita for recreational and habitat purposes.

Stanford impounds water seasonally (during periods of high flow) in two reservoirs above campus: Searsville Reservoir on Corte Madera Creek (just above its confluence with Bear Gulch Creek) and Felt Reservoir east of Los Trancos Creek (see Figure 1). Water is then drawn from these reservoirs as needed. Because of the way in which waters from multiple sources commingle during diversion and storage, total diversion and usage statistics are reported in aggregate monthly quantities to the SWRCB, on an annual basis. Together, the rights to diverted surface waters can yield over 1,250 AFY (1.12 mgd) to the lake water system. Stanford's most recent usage report dated March 2022 totaled 1,968.62 acre feet, primarily May through September, as submitted to the Water Board at:

https://rms.waterboards.ca.gov/Print_LIC2021.aspx?FORM_ID=530843

Since about 2020, Stanford has also been reusing stormwater up to a 2-year storm event, this stormwater runoff is routed by a diversion structure to a basin, filtered, and pumped through the non-potable irrigation (lake water) system to Felt Lake Reservoir for future irrigation on Stanford property. The captured runoff is metered for tracking with the other sources that contribute to the lake water system (Source: https://suwater.stanford.edu/water-supplies/stormwater-capture).

California Water Service - Bear Gulch/ Skylonda Mutual Water Company:

Bear Gulch Reservoir is a reservoir in the town of Woodside, California. It is the main storage for the Bear Gulch District of the California Water Service, holding up to 215 million US gallons of water, and serving 55,501 people. It is fed by water diverted by two dams on Bear Creek. Groundwater use in the past two years has been reported as zero, with all potable supply coming from SFPUC. The most recent local surface water from San Francisquito Creek watershed was in 2018-2019, with 936-acre feet reporting being used (Source: https://bawsca.org/members/profiles/cws_bear_gultch

Flood History

San Francisquito Creek has a history of recurring floods which have adversely impacted the safety and economic stability of the residents, businesses, and government property within the flood plain. Flooding within the watershed has been documented as far back as 1911, with significant flood events occurring in 1955, 1958, 1982, 1998, 2012, 2014, 2017 and 2022. San Francisquito Creek is "flashy", meaning stream flow levels can rise and fall quickly. The creek is characterized by a dry bed during summer and fall, and periodic high flows or even flooding, during winter rain events.

The maximum instantaneous peak flow recorded on San Francisquito Creek at the Stanford University US Geological Survey station occurred February 3, 1998, with a peak of 7,200 cfs. After record rainfalls, San Francisquito Creek overtopped its banks and inundated over 11,000 acres of land in Palo Alto, East Palo Alto, and Menlo Park, affecting approximately 1,700 residential and commercial structures.

The top five flows recorded at the USGS gage in Stanford's golf course are presented below:

	DATE	**PEAK FLOW** RATE (Cubic Feet per Second)
1.	FEBRUARY 3, 1998	7,200
2.	DECEMBER 31, 2022	6,340
3.	DECEMBER 22, 1955	5,560
4.	DECEMBER 23, 2012	5,400
5.	JANUARY 4, 1982	5,220

The SFCJPA recalibrated the hydraulic model after the 2012 storm and is recalibrating hydraulic model following the flood on December 31, 2022, that was followed by three atmospheric rivers in January 2023 that did not result in overbanking but did result in significant bank erosion.

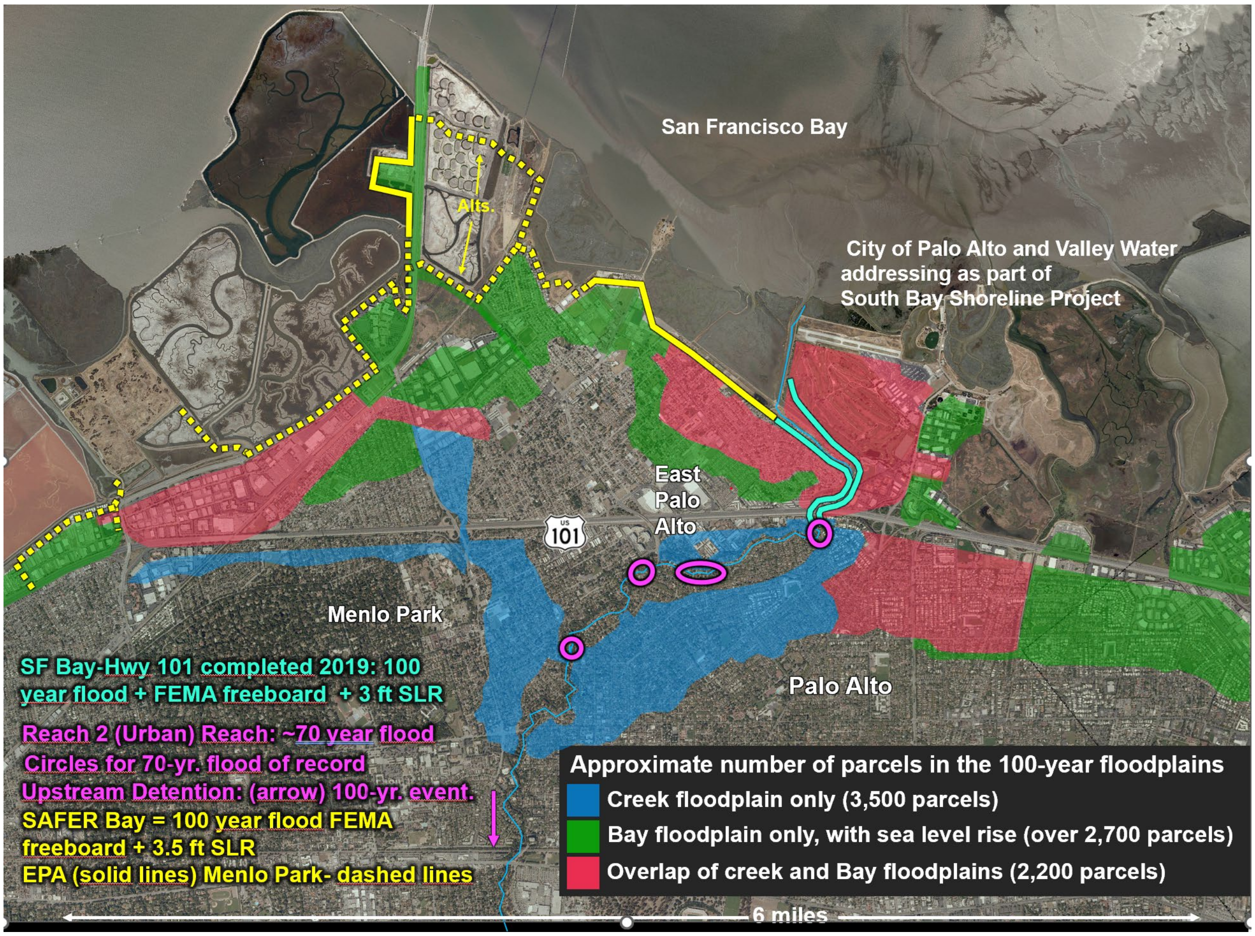

Figure 7 Preliminary FEMA Floodplain Designation and Approximate number of parcels to be addressed

Source: FEMA Preliminary Flood Insurance Rate Maps 2015. Panels 0311E; 001H, 0309E, 0314E

FEMA does not prepare maps of 70-year floods, but the hydraulic model used by the SFCJPA and our partners for the watershed indicate that the area is similar to a 100-year FEMA floodplain, but that depth of inundation are less than that for a 100-year flood.

3. Data Summary

The San Francisquito Creek Watershed has been studied for many years by many different entities for different purposes. The section describes the known data that has been collected to develop a scientifically sound an analytic framework for the San Francisquito Creek Watershed.

This data compilation is developed as an initial step in comprehensive watershed planning to establish baseline conditions, identify pollutant sources, and manage a changing watershed.

The goal of this data synthesis is to specify adaptive management measures in future versions of this plan that can effectively reduce both point and nonpoint sources of water quality impairments.

Types of Data

Known data collected in the watershed is summarized below for

- flow,
- water quality and
- watershed condition.

Flow: The SFCJPA provides real-time information for creek flow and rainfall gages west of Highway 280 at: http://floodwarning.sfcjpa.org/

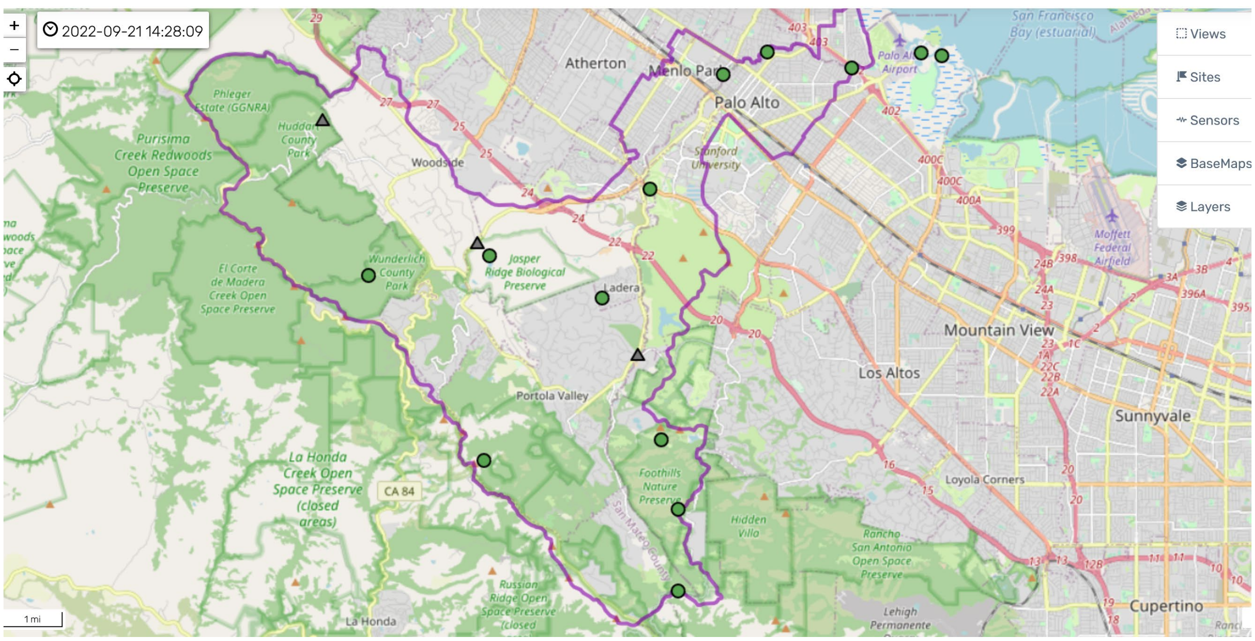

Figure 8. SFCJPA Creek Monitoring System

The City of Palo Alto has a camera and creek level monitors available at:

https://www.cityofpaloalto.org/Departments/Public-Works/Engineering-Services/Creek-Monitor-Cam

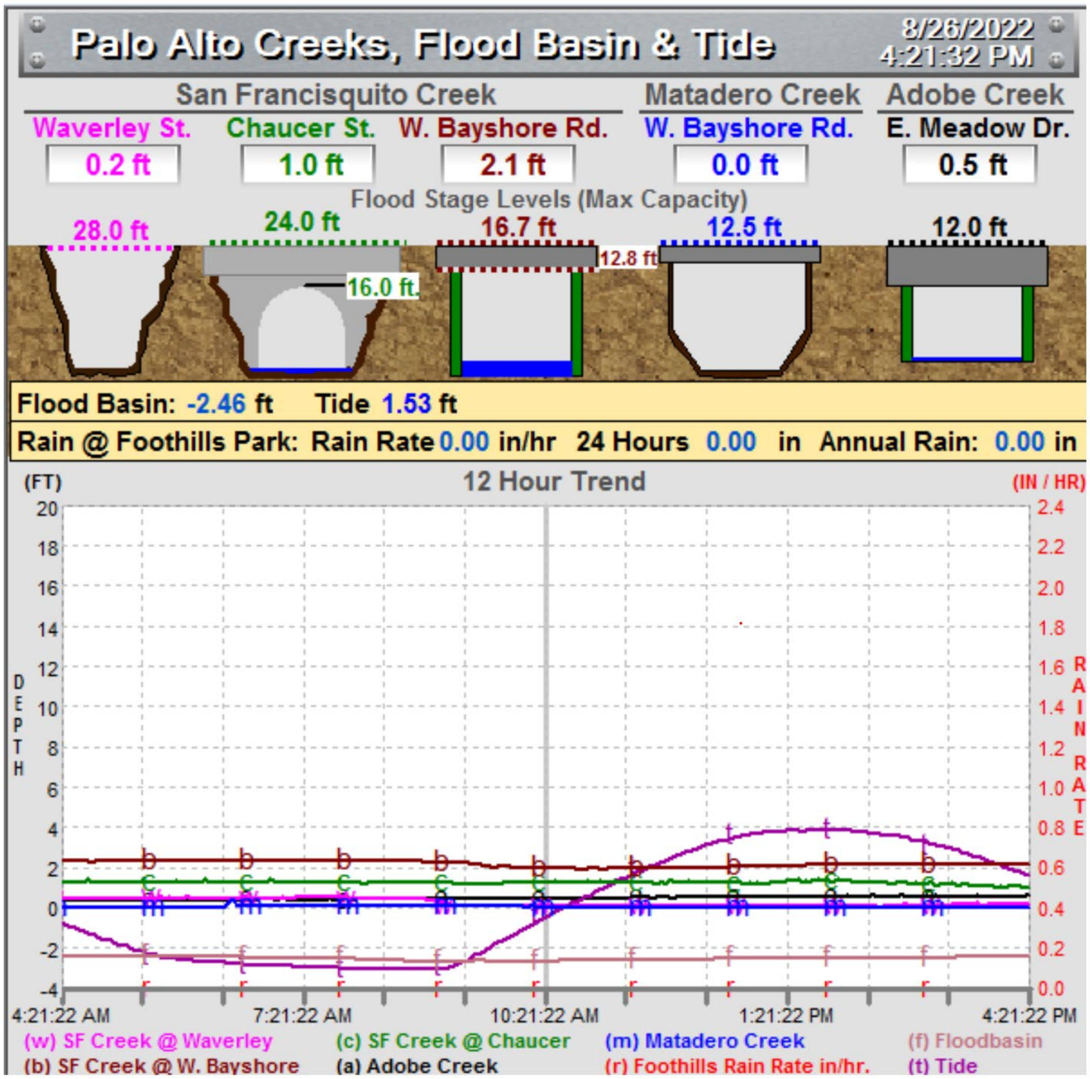

Figure 9 Example data from Palo Alto Creek Monitor

This data includes data collected by the USGS, SFCJPA and partners, research institutes, and non-governmental organizations.

The U.S. Geological Survey (USGS) Flow data has been collected since 1930 at a Stream gage located on Stanford University's Golf Course.

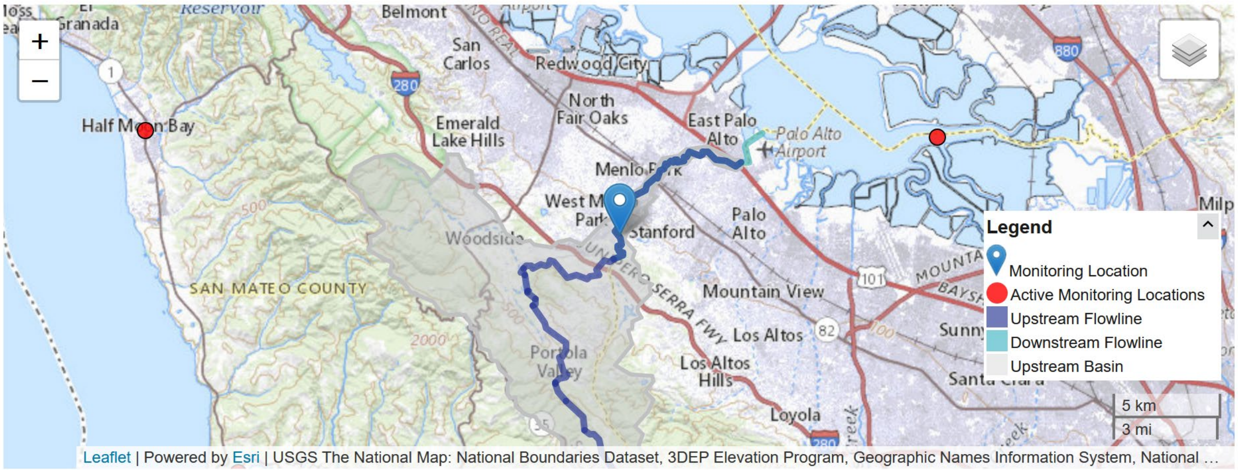

Figure 10 Location of USGS Stream Gage at Stanford Golf Course

The USGS stream gage data is available online at:

https://waterdata.usgs.gov/monitoring-location/11164500/#parameterCode=00065&period=P365D&compare=true

Streamflow gains and losses in the watershed were evaluated in 1997 and re-evaluated in 2017 as part of San Mateo County's Groundwater Assessment. The 2017 evaluation generally verified the earlier results and confirmed that water in the upper watershed has minimal recharge over bedrock, has variable gains and losses along the urban reach that may be masked in some areas by urban water management practices, and in the estuary reach[3] is affected by tides.

Water Quality

The USGS website above lists available water quality data, primarily from 2017 that are presented by type and dates in Figure 11.

[3] The segment of the San Francisquito Creek that is tidally influenced, roughly from the Newell Road bridge downstream to where the creek meets the bay.

Summary of All Available Data

USGS Parameter Group	Data Types	Start Date	End Date
Biological	Water-quality	2017-05-03	2017-05-03
Information	Water-quality	2017-03-16	2017-05-03
Inorganics, Major, Metals	Water-quality	2017-03-16	2017-05-03
Inorganics, Major, Non-metals	Water-quality	2017-03-16	2017-05-03
Inorganics, Minor, Non-metals	Water-quality	2017-05-03	2017-05-03
Inorganics, Minor, metals	Water-quality	2017-03-23	2017-05-03
Nutrient	Water-quality	2017-03-16	2017-05-03
Organics, other	Water-quality	2017-03-16	2017-05-03
Organics, pesticide	Water-quality	2017-03-16	2017-05-03
Physical	Daily Values, Unit Values, Water-quality	1930-10-01	2022-08-26
Radiochemistry	Water-quality	2017-05-03	2017-05-03
Sediment	Water-quality	1958-01-10	2017-05-03
Stable Isotopes	Water-quality	2017-04-20	2017-04-20
n/a	Peak Measurements	1931-01-01	2021-01-28
n/a	Site Visits	1931-12-27	2022-06-14
n/a	USGS Annual Water Data Reports Site	2005-01-01	2021-01-01

Figure 11 USGS Data for San Francisquito Creek

Water Quality Monitoring was performed by SFCJPA partners at Grassroots Ecology. San Francisquito Creek has been monitored since 2004, with data from 2013-2022 available online at:

https://www.grassrootsecology.org/water-quality-monitoring

Volunteers and staff collected data on a quarterly basis at six stations along San Francisquito Creek for general water quality parameters using handheld devices following specified protocols.

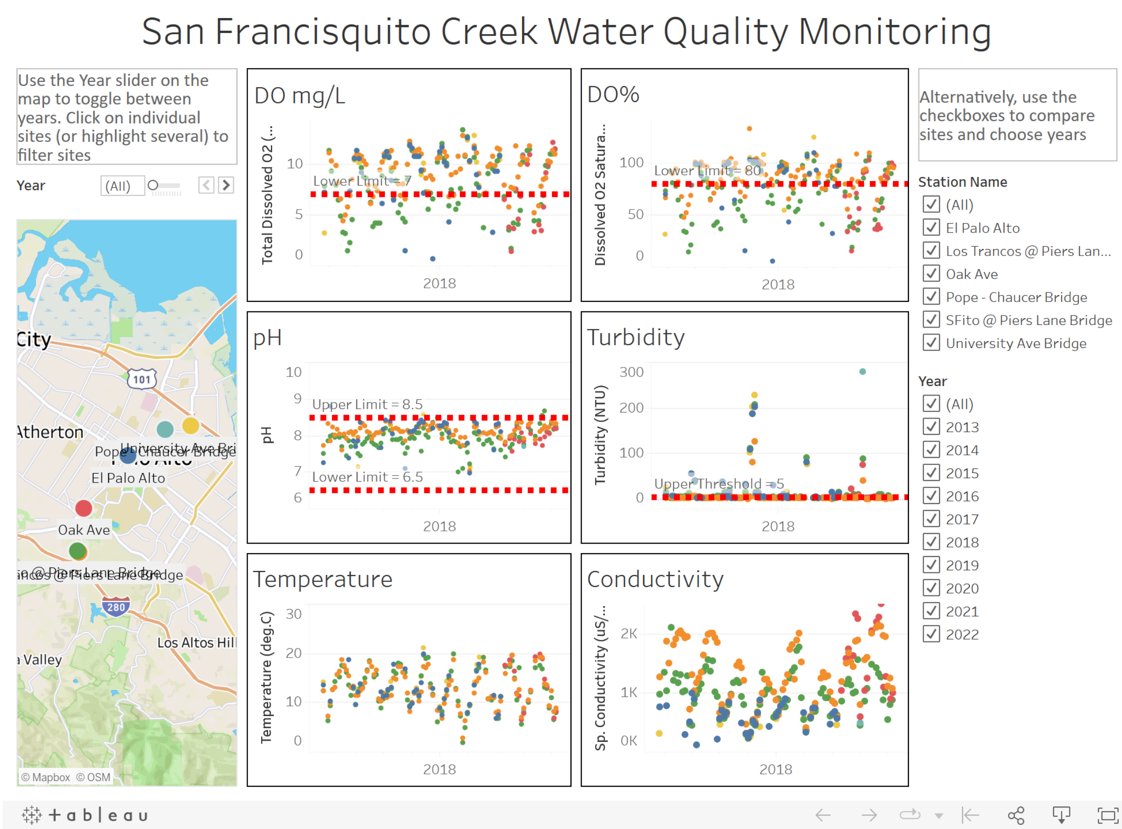

Figure 12 Water Quality Data Summary, August 2022

The SLAC Linear Accelerator Center collected data in San Francisquito Creek, which roughly forms the southern boundary of SLAC. A preliminary assessment of San Francisquito Creek was completed in 1995 and presents data collected in 1992 for 42 stream sediment samples and 9 surface water samples (from 40 sampling points) for various analytical parameters, including PCBs, pesticides, metals, total petroleum hydrocarbons, phosphates and nitrate (SLAC 1995). The purpose of this data collections was to evaluate potential impact of activities at SLAC on drainages that lead to the San Francisquito Creek Watershed. No detectable concentrations of PCBs were identified in the 9 surface water samples (SLAC 1995).

Overall Watershed Condition:

California Rapid Assessment Method (CRAM) Assessment: Valley Water has partnered with SFEI since 2010 to evaluate the overall condition of watersheds in Valley Water's jurisdiction. This included a 2017 initial assessment of the Santa Clara side of the San Francisquito Creek Watershed, defined by Valley

Water as the Lower Peninsula Watershed. The Lower Peninsula Watershed as defined by Valley Water encompasses a larger area and other natural watersheds, but specific data was collected to represent the Santa Clara County side of San Francisquito Creek.

This evaluation used the CRAM method, which is a cost-effective and scientifically defensible rapid assessment method for monitoring and assessing the ecological conditions of streams and wetlands throughout California. CRAM is designed evaluate conditions based on its landscape setting, hydrology, physical structure, and biological structure. Because the methodology is standardized, ecological condition scores can be compared at the local, regional, and statewide landscape scales.

The evaluation consisted of evaluating representative locations in the Santa Clara County side of the watershed, which represents about 22% of the entire San Francisquito Creek Watershed. The results determined that in the San Francisquito Creek watershed (within Santa Clara County), 21% of streams were in good condition. Most stream segments evaluated (71%) were classified as being in fair condition, and six percent were in poor condition. Important stressors of the San Francisquito Creek watershed were identified to be:

- location near a transportation corridor,
- urban land use
- engineered channel,
- industrial commercial land use,
- recreational use, and
- a lack of treatment for invasive plants

Valley Water's study recognized the importance of evaluating San Mateo County side of the Watershed as evidenced by the proposed sample draw. However, being in San Mateo County, Valley Water lacked the authority to implement outside their jurisdiction (Figure 13).

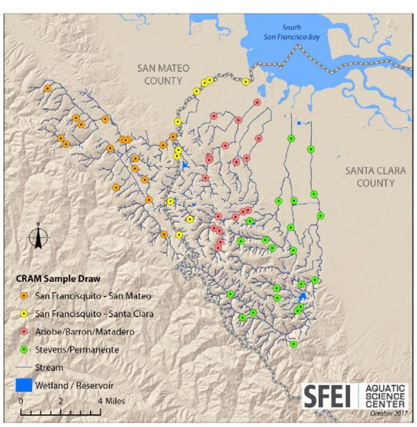

Figure 4. Map of the targeted CRAM stream condition sites in the Lower Peninsula watershed by PAI. The San Francisquito Creek stream reaches within San Mateo County (sites shown here in orange) were not assessed in 2016.

Figure 13. Target Area for Stream Condition Assessment

Geomorphic Stability:

The 2004 *San Francisquito Creek Watershed Analysis and Sediment Reduction Plan*, Final Report May 2004 (SFCJPA 2004) presents information on the watershed, and focuses on erosion, transport, and deposition of sediment in the San Francisquito Creek watershed based on natural and human-related activities that have modified hydrology, altered erosion rates, or trapped sediment. Historical information indicates that debris slides are important sediment sources in San Francisquito Creek Watershed, and that San Francisquito Creek is susceptible to erosion depending on many factors, including rock type, slope, hydromodification and of course mainly from large precipitation events. This report developed preliminary sediment budgets for sub-watersheds.

The 2000 Bank Stability Master Plan developed bank stability curves every 200 feet along the creek (SFCJPA 2004b). The results were presented on 18 panels that constitute the condition for geomorphic stability of San Francisquito Creek. The maps include bed sediment characteristics, information on the habitat available to organisms living on or within the bed of the creek and sediment facies. In addition, information presented on channel bed material can be used with hydraulic information to calculate the depth of scour likely to occur at a structure (SFCJPA 2000).

The 2000 Bank Stabilization Master Plan determined that bank instability is a widespread problem, with approximately 40% of the study reach with unstable banks. The majority of existing revetments are composed of sacked concrete, gabion baskets, sprayed concrete (“shot-crete”), and large placed boulders. Areas of dumped rubble generally were determined to be ineffective in preventing erosion. Steep bank angles and sparse surface protection (vegetative and structural)are closely correlated with bank instability in the most severely eroded sections of the study reach (SFCJPA 2000).

In 2017, regional curves for geomorphic stability were developed for a trio of creeks, including San Francisquito Creek (Laurel Collins and Leventhal, Roger, 2017). This study characterized the San Francisquito Creek watershed as, “a highly altered urbanized creek channel that has lost much of its floodplain and as such has higher instability and flooding potential as compared with a more natural channel. It has been altered for flood control purposes.” The San Francisquito Creek evaluation included 32 data points at 21 different field sites.

The bank-full curve line represents an approximate one-and-a-half to a two-year storm event. The measurements in San Francisquito Creek Watershed are all located upstream of Searsville Dam and would only apply in this area. Bank-full would be different in different parts of a watershed, but in general may be used to assist in designing restoration that moves sediment and minimizes maintenance needs and as a calibration tool to a model.

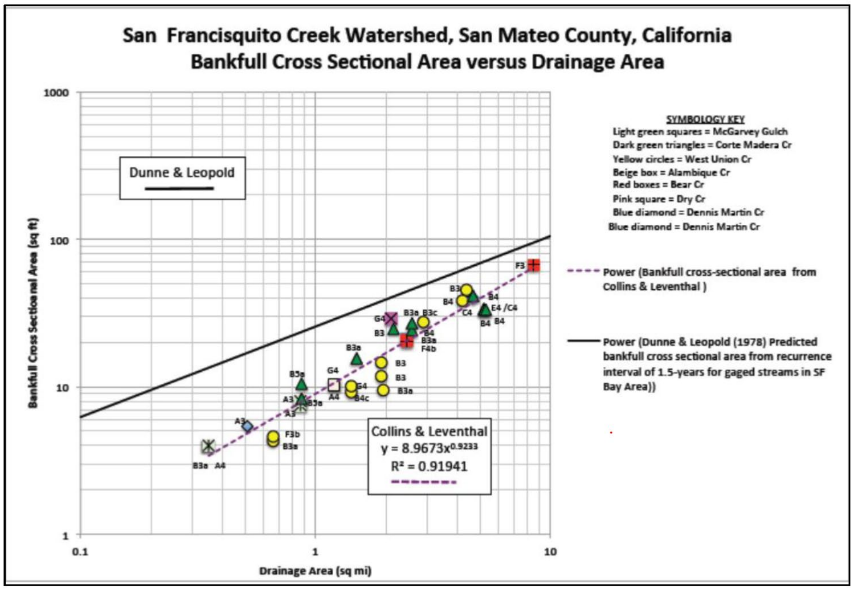

Figure 14 Bankfull Cross-Section Area versus Drainage Area

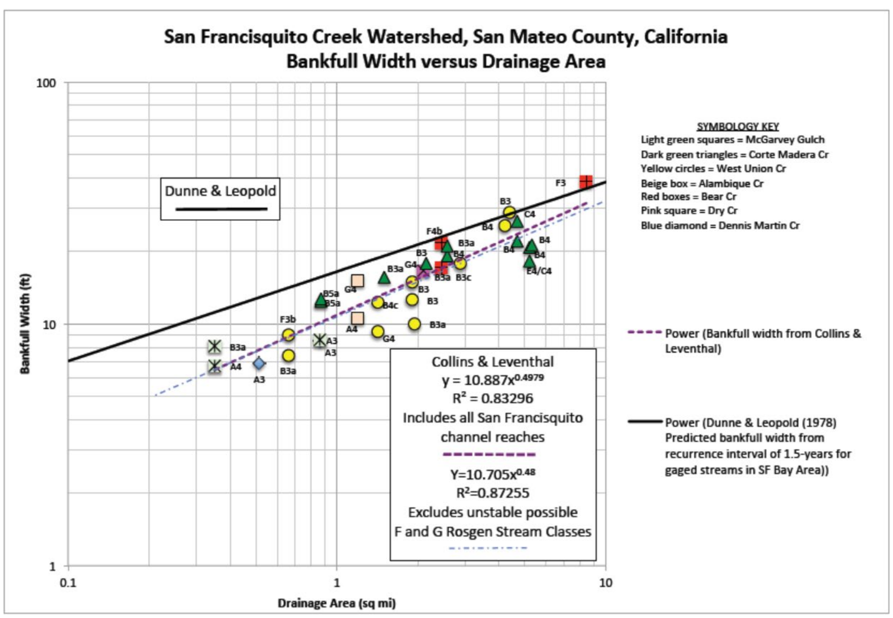

Figure 15. Bankfull Width versus Drainage Area

The authors suggested that with current influences of land use impacts and a changing climatic regime, that it will be key to incorporate flood prone width into channel restoration design that uses hydraulic geometry concepts. They also recommended that existing stream gages continue to be maintained and that additional data, as it is developed should be added to the local curves (Laurel Collins and Roger Leventhal, 2017).

Analytic Framework

There is a wealth of data collected within the San Francisquito Creek and floodplain that provides a baseline to assess conditions within the watershed. Specifically, the following summary observations may be made:

1. **Water Quality**- the creek and associated groundwater are used for potable and irrigation supply and are therefore generally considered acceptable quality but may locally exceed secondary Maximum Contaminant Levels for iron and manganese. Shallow groundwater is locally contaminated by past industrial and agricultural practices and current urban runoff and not used as a drinking water source. Surface water in the creek is listed by the State Water Board under the 303(d) list as impaired for Diazinon, sedimentation/siltation, and trash.
2. **Water Quantity**-groundwater and surface water are directly hydraulicly connected. Groundwater withdrawals could affect creek flows and fish spawning. Local entities have agreed to sustainably manage this resource and continued monitoring and continued data sharing is needed to assess optimum conditions.
3. **Watershed Condition**- Watershed conditions are considered good in the upper watershed and fair or poor in urban and estuary reaches. In addition, due to planned changes in the watershed, continued monitoring of water quality and creek capacity are indicated.

Suggested Additional Data Collection

The following are preliminary recommendations based SFCJPA's review of data to date:

- Review and incorporate 2022 storms into project planning.
- Increase trash removal activities in lower reaches, especially around Woodland Avenue where dumping occurs.
- Invasive species removal – large scale invasive tree and plant removal would increase the value of the habitat in the creek and riparian corridor and increase creek capacity.
- Continued water quality monitoring (Grassroots Ecology is no longer monitoring San Francisquito Creek due to loss of grant funding.). Sediment and creek capacity will be key parameters to evaluate.
- Stream Condition Assessment using pre-selected sample draw locations by Valley Water California Rapid Assessment Method for the San Mateo County side of watershed

In addition, surface water level and groundwater pumping are monitored across different entities, may miss watershed scale effects. Of particular interest are how flow regimes may be impacted and what those impacts mean for anadromous fish habitat in the watershed. This may be an area of future coordination and collaboration as projects move forward.

4. Integrated Planning with Watershed Partners

The SFCJPA works across jurisdictional boundaries to coordinate and collaborate with a wide range of organizations to develop and implement projects that address a large part of the watershed system that could create or be affected by flood events. The SFCJPA organizational structure has been cited as a model for local governments in planning for climate change impacts in a case study by the Bay Conservation and Development Commission (BCDC), the San Francisco Bay National Estuarine Research Reserve (NERR) and the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center. The SFCJPA Board is composed of elected officials from each of our member organizations.

Projects completed in the Watershed in 2022 include Children's Health Council Bank Stabilization Project using log crib walls. Projects in progress include Stanford's project at Searsville and the SFCJPA's Reach 2 and Reach 3 projects.

SFCJPA Members

The five SFCJPA members have collaborated on past key documents that affect the watershed, including the following: Bank Stabilization Master Plan, draft plans for Total Maximum Daily Loads to achieve water quality standards, and Stormwater Resource Plans for Green Infrastructure. The SFCJPA also provides advice on proposed construction projects along the Creek.

In addition to our collaborative work, each of our member entities has related projects that will ultimately help achieve the SFCJPA overall goal and vision. The list below is not intended to be exhaustive but rather to illustrate some current projects that affect the watershed or projects that are part of our comprehensive plan.

Valley Water

Valley Water has specific funding for San Francisquito Creek as part of the Safe Clean Water and Natural Flood Protection Program, a parcel tax approved by voters in Santa Clara County in 2012. This parcel tax was made permanent in 2020. As the largest contributor of SFCJPA creek project funding, Valley Water not only provided approximately $30,000,000 for the Reach 1 Downstream project construction, but also provided bid, award, and construction oversight of the work. Valley water has provided the HEC-RAS stream flow modeling for our project work. Valley Water's Stream Maintenance Program covers San Francisquito Creek on the Santa Clara County side of the creek. In January 2020, Valley Water completed the San Francisquito Creek Emergency Action Plan to provide guidance on how Valley Water makes decisions during storm and flood events. It is consistent with the San Francisquito Creek Multi-Agency Coordination Operational Plan for Severe Flood events.

Valley Water also has several projects that will reduce tidal flooding and address sea level rise like the Palo Alto Flood Basin Tide Gates Project which will replace the tide gates that protect homes and businesses in Palo Alto and the San Francisco Bay Shoreline Project. These projects are being coordinated with SAFER Bay Project to ensure consistent design standards and to avoid unintended consequences.

San Mateo County/ Flood and Sea Level Rise Resiliency District (FSLRD) also known as OneShoreline.

The FSLRD, which began January 2020, is a key partner for SAFER Bay. In addition, OneShoreline has a mission to address flooding and sea level rise within San Mateo County. The SFCJPA worked collaboratively with OneShoreline on incorporating sea level rise into Bedwell Bayfront Park entrance improvements. We anticipate a continued partnership with OneShoreline as a funding partner for SFCJPA, as well as for shared mission area to mitigate flooding, creek maintenance activities and land easements. At some point in the future, OneShoreline may assume a leadership role with some aspects of the SAFER Bay project.

East Palo Alto

East Palo Alto was a key partner for the Reach 1 Downstream Project and continues with maintenance of the completed project along with Valley Water. East Palo Alto has taken the lead in implementation with a portion of the SAFER Bay Project known as Phase 1 and has committed $5.5 million of capital funding for construction and long-term maintenance. A letter from FEMA dated September 1, 2022, identified $4,649,240.00 in Phase 1 funding for design, and $156,323.00 for management costs for the SAFER Bay Project.

Menlo Park

Menlo Park has provided strategic assistance to SFCJPA, including housing the SFCJPA for many years after formation, and continues to be a key stakeholder for our project work. The Reach 2 Upstream project will protect property and infrastructure in Menlo Park. Menlo Park is a key stakeholder for SAFER Bay, and was lead on a $50M FEMA BRIC grant that was identified for funding July 2021.

Palo Alto

Palo Alto has been a key stakeholder for the Reach 1 Downstream Project, Reach 2 Upstream Project and SAFER Bay. Palo Alto has several projects that are in the watershed, including the Newell Bridge replacement project with Caltrans, and their collaboration with Valley Water on the Flood Basin Tide Gates and the Shoreline Project. The San Francisco Bay Shoreline Project is a regional climate adaptation project extending from Palo Alto to Alviso. The SFCJPA's SAFER project communicates with key project stakeholders to ensure coordination and consistency. The City of Palo Alto completed a Sea Level Rise Vulnerability Assessment in June 2022 with key vulnerabilities identified including increased number of flooded parcels, emergent groundwater, liquefaction, mobilization of contaminants and compromised infrastructure, including utilities and roads.

SFCJPA Partners

Our partners have included the US Army Corps of Engineers, Don Edwards National Wildlife Refuge, California Department of Water Resources, San Francisco Estuary Partnership, San Francisco Bay Restoration Authority, Stanford University, PG&E, Facebook, East Palo Alto Sanitary District, CalTrans, US

Geological Survey (USGS), South Bay Saltponds Restoration Authority (SBSPRA), San Francisco Estuary Institute (SFEI), Association of Bay Area Governments (ABAG), the San Francisco Regional Water Quality Control Board, Woodland Park Apartments, Sand Hill Property management, West-of-Bayshore Community Association, and many other consultants, non-profit entities and regulatory agencies.

The work of the SFCJPA relies on collaboration and coordination. We acknowledge our role in the success of others, and their roles in our success. Not all past or present partners are listed among the illustrative examples below.

U S Army Corps of Engineers

The SFCJPA has a long-standing partnership with USACE. This includes collaboration on the initial hydraulic model for San Francisquito Creek (Noble 2009) and reviewing modifications to that model. USACE has been part of a CAP 205 Study in 2003 and a GI Study 2004-2020. We are now working with USACE on a new CAP 205 partnership for key project element(s) that may result in a favorable cost benefit ratio to alleviate floods. We recognize that the ACOE CAP 205 has a single mission for flood protection and that is why we are examining project elements, such as channel widening in Reach 2 that best fit that definition.

California Department of Water Resources (DWR)

The DWR has been a key funding partner for SFCJPA projects, particularly through the Integrated Water Resources Planning Program and Local Levee Repair programs. DWR grant funding totals more than of $17,000,000, with more than $14,000,000 that enabled construction of the Reach 1 Downstream project, SAFER Bay Feasibility Studies and SAFER Bay Phase 1 design permitting. For the Reach 2 Upstream project, DWR has awarded almost $3 million in funding in June 2020 from Integrated Regional Water Management Proposition 1, Round 1 funding that is being managed through the San Francisco Estuary Partnership.

San Francisco Bay Restoration Authority (SFBRA)

The SFBRA is a regional agency created to fund shoreline projects that will protect, restore, and enhance San Francisco Bay through the allocation of funds raised by the Measure AA parcel tax. The SFCJPA has received funding for planning and design for the SAFER Bay Project from the SFBRA. This significant funding is enabling the forward movement of technical studies, designs up to 30% and CEQA.

California Office of Emergency Services/FEMA

The Cal OES/FEMA is a funding partner for both the Reach 2 Upstream project and the SAFER Bay Phase 1 in East Palo Alto and Menlo Park.

Don Edwards National Wildlife Refuge-

The Reach 1 project required coordination with Don Edwards National Wildlife Refuge, and the SFCJPA is continuing to coordinate with the Refuge on restoration elements in the Estuary Reach as well as SAFER Bay.

Stanford University

Stanford University is the largest landowner in the watershed and an important watershed partner with the SFCJPA. We have worked closely with Stanford and used output from their sediment transport model for the Reach 2 Upstream project simulations. Our 2009 feasibility evaluation of potential upstream offline detention sites are all on Stanford land and Stanford has agreed to allow SFCJPA to evaluate this option. The SFCJPA has determined that upstream detention is technically feasible and is currently evaluating costs and potential benefits of implementation.

Stanford is moving forward with the Searsville Watershed Restoration Project, which is Stanford's preferred alternative to improve fish passage, manage accumulated and future sediment and avoid an increase in upstream or downstream flood threats in the San Francisquito Creek watershed. The Notice of Intent and Notice of Preparation of environmental documentation were published February 8, 2023, with environmental reports expected in 2024 and construction beginning in 2025.

This project would create an opening at the base of Searsville Dam that would allow the creek to flow through the dam and provide upstream fish passage conditions. The proposed opening includes the installation of a tunnel at the base of the dam, with a gate on the upstream face of the dam. During the flushing period, the tunnel would be opened at the onset of pre-determined weather conditions expected to successfully initiate flushing of the accumulated sediment. After the initial flushing period when the accumulated sediments have been flushed out to the Bay, the tunnel would be left open in a fixed position to provide the optimized peak flow attenuation. The Searsville Watershed Restoration Project also includes modifications to the San Francisquito Creek pump station to relocate the Searsville point of diversion, an expansion of Felt Reservoir to replace the Searsville storage function to this off stream reservoir.

San Francisquito Creek is considered to be an aggrading stream with sediment deposition in downstream reaches (SFEI 2009 and Point Blue Conservation Science, 2020). This project would restore hydrologic and sediment transport processes that have been held back by Searsville Dam. The project must seek a balance of sedimentation traps, fish passage improvement, and high flow attenuation, while avoiding adverse impacts to the creek banks and existing channel capacities. The project will require sediment removal for accumulated sediments, as well as afterwards at intervals that will be determined by storm intensity and sediment removal triggers. For example, sediment removal has occurred in the downstream of Highway 101 about every 20 years because this area is very flat and influenced by tides. Flow velocities naturally decrease in this area, allowing sediment to settle out of the water and accumulate. The frequency of sediment removal will need to increase with the completion of the Searsville Project. In addition, there will be short term impacts during construction and during the flushing period, including temporary adverse effects on steelhead populations downstream of Searsville Dam.

South Bay Salt Ponds Restoration Authority (SBSPRA)

The SBSPRA has been a partner for the past six years on our SAFER Bay Project. We are working with the SBSPRA Project Management Team on restoration scenarios for former salt ponds R1 and R2. This includes design options that are currently best suited for this area based on SBSPRA adaptive management plan.

SFEI

The SFCJPA has partnered with SFEI since 2009 to develop historical ecology of the watershed and recommendations to improve flood control as part of Flood Control 2.0. In 2016, SFEI assessed the condition of the Santa Clara side of the watershed using the widely accepted California Rapid Assessment Methodology.

We continue to explore partnerships with SFEI and others for SAFER Bay and rising groundwater.

NGO partners

The SFCJPA formed relationships with several local non-profits, among them, the Watershed Council, Grassroots Ecology, Canopy, Nuestra Casa, Climate Resilient Communities, Acterra, and The Nature Conservancy.

The Watershed Council facilitated the development of the first collaboratively created watershed vision in 2005.

Grassroot Ecology is a restoration and educational partner with regular events that benefit San Francisquito Creek, including monthly water quality citizen science, invasive plant removal, coordination of community creek clean-up events, with many restoration projects in our watershed. Their native plant nursery has supplied phytophthora-free plants for our Reach 1 Downstream project and is located within the watershed in Palo Alto's Foothill Park.

The Nature Conservancy is a partner with the SFCJPA for nature-based flood protection and assessing the economic value of wetlands, which completed evaluations in December 2022.

Nuestra Casa and Climate Resilient Communities are partnerships developed in 2019 for public outreach for the SAFER Bay Phase 1 Project to specifically engage economically disadvantaged members of our communities.

Stormwater Resource and Green Infrastructure Plans and One Water Plans

The City/County Association of Governments of San Mateo County developed a Stormwater Resource Plan in February 2017 that used a watershed approach to identify and prioritize projects for implementation.

In 2019, the Santa Clara Valley Urban Runoff Pollution Prevention Program and Valley Water developed a SWRP for the Santa Clara County side of San Francisquito Creek.

The SFCJPA reviewed and provided input to each of these plans.

Each of our member cities is or has developed Green Infrastructure Plans that are consistent with the Stormwater Resources Plans.

Both Valley Water and the City of Palo Alto are developing One Water Plans. These plans have both a stewardship and sustainability component. For example, the City of Palo Alto lists as a key action in their draft *2021 Sustainability and Climate Action Plan* by 2030 to achieve a 10% increase in acres of watershed treated within the City compared to the 2020 baseline, utilizing stormwater management to protect the San Francisco Bay and increasing beneficial use of captured stormwater (City of Palo Alto, https://www.cityofpaloalto.org/City-Hall/Sustainability/SCAP).

The SFCJPA believes that green infrastructure has an important role in managing stormwater runoff on a local level and encourages implementation where possible.

4. Comprehensive Flood Protection and Ecosystem Restoration Program

This section discuses SFCJPA projects and how they work together to form a suite of interrelated projects each with independent benefits, but together form a cohesive program. The following projects are components of the SFCJPA's overall plan to provide 100-year flood protection and improve habitat and ecosystems**.**

Reach 1 - San Francisco Bay to Highway 101: Downstream Project

This completed Reach 1 "Downstream" project was the necessary first step in our plan. The project included widening the creek channel, constructing new setback levees and flood walls, and creating in-channel marsh plain. In total, this project created more than 22 acres of new and improved marsh plain and added new trails on top of the levees that connect to the San Francisco Bay Trail and West Bayshore Road.

This project specifically incorporated consideration of three feet-of sea level rise. When considering the safety factor of FEMA freeboard, the project as built protects against 100-year creek flows- up to 10 feet of sea level rise compared to today's daily high tide. (Completed June 2019).

The SFCJPA will work with FEMA to determine if the completion of Reach 1 project will allow some properties, particularly those in East Palo Alto, to have lower premiums for flood insurance.

Reach 2 – Highway 101 to Pope Chaucer Bridge

This project is designed to provide protection to people and property from a flood event similar to the 1998 event, which is considered a 70-year flood, while maintaining or improving the natural character of the banks and channel and improving in-channel habitat. The 70-year flood is the largest recorded flood since the US Geological Survey began measurements in the 1930's. The work includes widening the channel in multiple locations (see Figure 3), and repairing or replacing existing, aging top-of-bank structures which protect communities on either side of the creek in Palo Alto and East Palo Alto.

The City of Palo Alto has a parallel project to replace the Newell Road Bridge. Replacement of the Newell Road Bridge is part of the SFCJPA comprehensive plan but is being led by Caltrans and the City of Palo Alto. The bridge is a hydraulic constriction but is also functionally obsolete and therefore eligible for Caltrans funding to replace it for traffic safety. The new bridge is designed to Caltrans standards for safety and the SFCJPA design flow. Construction of the new bridge will be covered under the SFCJPA's regulatory permits for creek work.

The series of rainstorms on December 31 that resulted in flooding and three atmospheric rivers in January 2023 are being used to validate and potentially re-calibrate the Reach 2 project approach.

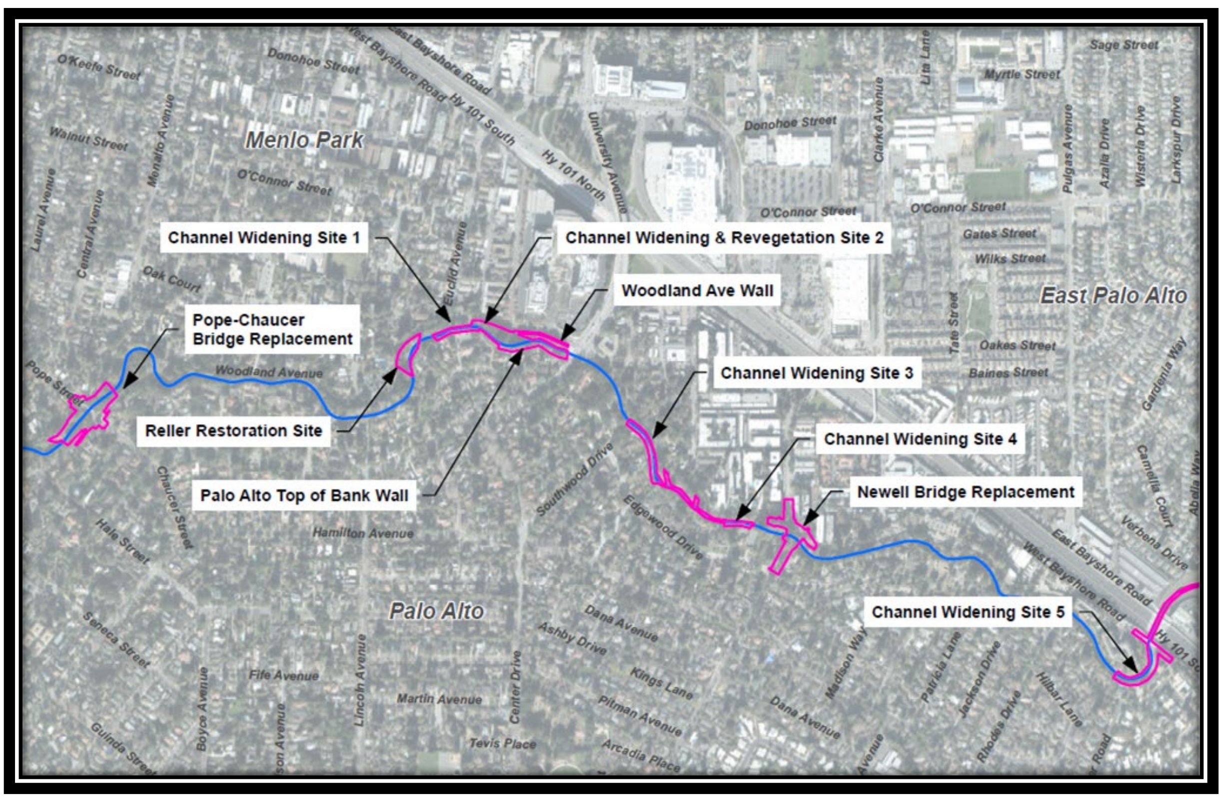

Figure 16. Location of Urban Reach 2 Project Elements

The area around these project elements is fully developed, with Woodland Avenue on the Menlo Park side and residential properties lining the opposite creek bank in Palo Alto. Most of the creek widening areas are constrained by engineering considerations, including shear stress and velocity requirements, and require updated hard armoring, while incorporating improvements to habitat. At one location in East Palo Alto, a large concrete structure will be removed, the creek bank will be regraded to a more natural configuration and planted with native riparian vegetation. The SFCJPA has initiated pre-permit coordination with State and Federal Fish and Wildlife agencies to ensure the project is designed to improve habitat and consider minimum flow depth for fish migration.

Downstream of Newell Road bridge, top-of-bank structures are being evaluated. These aging structures will either need to be repaired or replaced to continue providing protection to the communities of Palo Alto and East Palo Alto. The SFCJPA began work on a Supplemental Environmental Impact Report (SEIR) for this work in January 2023, with an approximate 9-month timeline for the release of the draft SEIR.

The Pope Chaucer Bridge, which is a concrete culvert, is planned to be replaced with a new bridge and the natural creek bed will be restored. The new bridge will be as open as possible, taking into consideration constraints on the bridge design including existing homes in the area, maintaining street elevations, and ensuring safe pedestrian access. The intersections on both the Palo Alto and Menlo Park sides will be matched to the existing elevation (Construction anticipated 2023-2024). The Newell Bridge replacement must be completed before the Pope Chaucer bridge work can begin.

Following project completion, the SFCJPA will explore with FEMA if creek widening and bridge replacements in Reach 2 can allow some properties to be removed from flood insurance requirements and/or pay lower premiums.

Reach 3 – Upstream Detention for 100-Year Flood Protection

Meeting the Federal Emergency Management Agency (FEMA) requirements for 100-year flood protection, including FEMA freeboard, is envisioned as an additive project that was evaluated at a programmatic level in our September 2019 Environmental Impact Report. Freeboard is a factor of safety usually expressed in feet above a flood level for purposes of floodplain management and is used by FEMA to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed. Freeboard is not required by FEMA’s National Flood Insurance Program standards, but communities are encouraged to adopt at least a one-foot freeboard to account for the one-foot rise built into the concept of designating a floodway and the encroachment requirements where floodways have not been designated. Freeboard results in significantly lower flood insurance rates due to lower flood risk.

Just as our Reach 2 project from Highway 101 to Pope-Chaucer Bridge does not provide 100-year protection with FEMA freeboard by itself, the topography of the upper watershed does not allow for upstream detention at the scale needed to provide 100-year protection with FEMA freeboard on its own. Only a combination of the completed Reach 1 and Reach 2 water conveyance and capacity improvements, supplemented by upstream detention and/or other similar flow reduction or floodproofing features can achieve 100-year protection with FEMA freeboard for San Francisquito Creek.

One ongoing effort that may contribute to reducing flows downstream is Stanford University's planned modifications to Searsville Dam (which Stanford University is leading) that will allow for free flow conditions during normal weather but provide some check-dam detention during large flow events. Another alternative could be constructing off-stream detention capacity that would provide additional, similar benefits as the Searsville Dam project.

The SFCJPA Board has dedicated funding to evaluate detention facility options. The SFCJPA is working closely with Stanford for access to and information about the area to adequately evaluate potential options on Stanford lands. Data collection for a project level evaluation of potential alternatives that may achieve 100-year flood protection with FEMA freeboard has been initiated. The SFCJPA's consultants will be providing a cost-benefit analysis in 2023. The SFCJPA is continuing to look for grant funding for the Reach 3 project.

Tidal flood protection and marsh restoration- Strategy to Advance Flood Protection and Ecosystem Restoration along San Francisco Bay (SAFER Bay Project)

The Strategy to Advance Flood protection, Ecosystem restoration and Recreation Project (SAFER Bay) addresses tidal flood protection and projected sea level rise by protecting critical infrastructure using natural and manmade flood protection features along San Francisco Bay within SFCJPA jurisdiction. Public Draft Feasibility reports were issued in 2016 for East Palo Alto and Menlo Park, and in 2019 for Palo Alto. This project is intended to close the protection gap in the tidally influenced areas outside of our completed Reach 1 project from San Francisco Bay to Highway 101 described above. The project concept and early activity goes back to at least 2013; however, with the creation of the San Mateo Flood and Sea Level Rise Resiliency District, this project could transition to OneShoreline at the mutual agreement of both organizations' boards. .

The SFCJPA has moved forward with a portion of this project in East Palo Alto and Menlo Park. We are coordinating with our member agencies, permitting agencies, and stakeholders on planning and design. The SFCJPA began CEQA with the release of a Notice of Preparation for environmental documentation on April 25, 2022. A Scoping Report summarizing the NOP process, and comments received was issued October 2022 and Community Outreach Plan and other documents are available on the SFCJPA's website. A draft Programmatic EIR, and project level EIR for portions of the project in East

Palo Alto, is anticipated to be released 2024. A Project Description prior to the release of the Draft EIR is planned for August 2023.

The SFCJPA Board adopted the Bay Adapt Platform in December 2021 for the SAFER Bay project. This regional strategy encompasses a broad range of planning, policy, community, and project decisions to protect people, infrastructure, and natural systems, balancing local economic growth and jobs, services, housing, and recreational opportunities and is focused on local decision-making. In addition, this platform networks regionally to coordinate actions to avoid unintended consequences around the Bay.

The SFCJPA convened a SAFER Bay community advisory committee December 2022 through our partnerships with Climate Resilient Communities and Nuestra Casa. The SFCJPA will continue to communicate and coordinate with multiple stakeholders and other regional adaptation projects via meetings and working groups.

Our completed Reach 1 Downstream project provides protection against flooding from San Francisquito Creek The SFCJPA's ultimate goal is to remove properties from the FEMA floodplain, and the associated requirement for flood insurance, to the extent feasible. SAFER Bay will build new levees and other flood control structures along the Bay in East Palo Alto and Menlo Park. When these planned improvements are built, the area will be protected from both creek and tidal flood risks and may then be evaluated for removal from the FEMA flood maps.

FEMA accredits levee systems with an emphasis on interior drainage and long term operations and maintenance. The SFCJPA is evaluating if a letter of for map revision to FEMA based on the completed Reach 1 project will be worthwhile to some residents and businesses. The SFCJPA will submit Conditional Letter of Map Revision for the SAFER Bay project to enable FEMA's review of the design.

The SAFER Bay project incorporates similar protection criteria as the completed Reach 1 Downstream project from San Francisco Bay to Highway 101.

5. Stewardship

This section addresses long term actions, including monitoring and maintenance of implemented work. The SFCJPA facilitates an annual maintenance walk with member agencies, Stanford and Grassroots Ecology. The walk identifies key maintenance actions required prior to the rainy season and assigns responsibilities for action to each member entity. The annual maintenance walk also identifies areas for annual creek cleanup by community volunteers.

The SFCJPA's projects provide for watershed stewardship, for both short and long term. In the short term, up to 10 years after project completion, monitoring and assessment is performed for the project's components and overall health of the watershed in the project area as part of the Mitigation and Monitoring Plan. In the long term, the project's Operation and Maintenance manual specifies annual assessments of project performance and five-year plans to evaluate the project's effect on the watershed. The Operation and Maintenance manual may form the basis for long term stewardship in the Watershed.

The SFCJPA has or will delegate maintenance actions to member agencies where a project is located. For example, Valley Water and the City of East Palo Alto are the leads for long term operations and maintenance for our Reach 1 project between S.F. Bay and Highway 101.

The two major items that the SFCJPA has heard consistently over the years that would be most beneficial for the watershed and floodplain are:

- increased removal of trash and
- removal of invasive species.

Large and heavy trash items (such as grocery carts, couches etc.) are removed by our member entities. Small trash items are removed as part of volunteer creek cleanup actions, typically twice a year. More areas of the creek would benefit from routine trash removals. In addition, enforcement, educational outreach may be useful tools to deter littering and illegal dumping activities.

Invasive species have been removed as part of SFCJPA projects, including Arundo removal that required several years of diligence to eradicate in one small area of the creek. Other areas of emergence have been noted in 2022-23. Invasive trees, particularly species of acacia, tree of heaven (Ailanthus altissima) and eucalyptus are prevalent in the creek bed, slopes and top of bank along the riparian corridor. No large scale removal action has occurred but, would benefit creek condition and capacity, particularly in the Urban Reach. Herbaceous non-native species, include cape ivy (Delairea odorata), yellow star thistle (Centaurea solstitialis), pepper grass (Cardaria draba) caster bean (Ricinus communis) and stinkwort (Dittrichia graveolens) are also common and small scale removal efforts by volunteers are welcome, but more aggressive action would be ideal for watershed and floodplain condition.

Removing trash and invasive species has an educational component to prevent, creating coordinated educational activities that may be useful as a watershed management tool.

6. Stakeholder Engagement

Ensuring the SFCJPA has the community's trust and confidence is essential to maintaining the SFCJPA's ability to execute projects. The SFCJPA's primary responsibility is to implement flood risk mitigation projects. These must also integrate as many co-benefits as possible – such as ecosystem restoration and recreation opportunities - into project design and construction.

The goals of community and stakeholder engagement are to:

- Promote awareness of the SFCJPA, its purpose, roles, responsibilities and priorities, and its multi-benefit creek or bay shoreline flood mitigation projects by informing community members and stakeholders.
- Engage community members and stakeholders for the purposes of understanding community and stakeholder priorities and to refine and improve project design and implementation based on community and stakeholder input.
- Support community members and stakeholder involvement in and contributions to the SFCJPA's projects' success through an effective public engagement processes.

(Center for Economic and Community Development, Engagement Toolbox*,* at https://aese.psu.edu/research/centers/cecd/engagement-toolbox/).

Tools and Approaches

Electronic communications will be used to support community and stakeholder engagement. There are various tools and options for the purpose, some are more suitable to the SFCJPA than others. The single most useful tool that the SFCJPA has identified is outreach in affected neighborhoods by meeting people where they are at a time convenient to them.

Website - Our website at www.sfcjpa.org conveys important information on projects, events and activities of the SFCJPA and its members or regional partners. The website hosts organizational documents, board meeting records, key project documents and schedule of meetings and events. The website also features links to our watershed data including stream and tide monitoring stations, and Palo Alto's real-time stream level monitor. This watershed data is an important community asset and is used by Emergency Operations personnel as part of winter flood response.

Newsletters – The SFCJPA implemented a quarterly electronic newsletter in 2020, with over 500 subscribers as of 2023. The newsletter provides information about SFCJPA projects, creek or shoreline related issues, upcoming events, and meetings. Special announcements, such as those for community project updates, have also been sent out via email to specific distribution lists and by U.S. Post to ensure community members and stakeholders are aware of critical information.

Social Media – Various social media tools can be useful for reaching community members and stakeholders. However, maintaining social media accounts requires regular updates and dedicated staff with time for one-on-one engagement. With our small staff, and other mechanisms for outreach, our presence on these social media platforms is currently a low priority. The SFCJPA may choose to selectively use NextDoor through its member agencies' accounts, as it can be an effective platform for reaching local residents about specific events or issues.

Print and Traditional Media – The SFCJPA will maintain connections with local media outlets and keep them informed through media alerts when appropriate. The SFCJPA responds as appropriate to media inquiries.

SFCJPA Meetings & events - Regular in-person meetings are an exceptional way to engage community members and stakeholders. However, for as long as the COVID-19 pandemic is a consideration, any in-person meetings will be planned with appropriate caution. In -person meetings are utilized for project updates, tours for interested stakeholders, various working groups and committees, and other special events, alone or in combination with web-based meetings.

SFCJPA Comprehensive Plan -This document is considered a key tool to convey our vision, goals and objectives.

SFCJPA presentations to City Councils, Boards of Supervisors or their various committees and Commissions - SFCJPA Board members, Executive Director, and staff may make formal or informal presentations to the elected bodies of its member agencies, or their appointed commissions, as part of project approvals, or to provide less formal project or organizational updates.

Informal in-person, "office hours", or other local meetings – SFCJPA Board members, Executive Director and staff may set up informal opportunities for community members to visit and discuss creek or bay margin projects in an unscripted and informal setting. These settings may only reach a few community members at a time, but provide a relaxed setting, convenient to community members.

Board meetings – In addition to being the primary vehicle by which the SFCJPA Board conducts business, regular board meetings provide an opportunity to hear from community members and to share information about SFCJPA operations and projects with stakeholders. All Board meetings are recorded and posted on the SFCJPA's website and YouTube channel.

Study sessions – These non-action item board meetings are an opportunity to explore topics of relevance to the SFCJPA. Study sessions often feature both in-house and outside experts presenting information. Study sessions provide community members and stakeholders the opportunity to hear the same information as the board, and to ask questions of the presenters. Study sessions conducted in person are typically hosted in a seminar format, with presentations, question and answer sessions and perhaps break-out groups for discussion and reporting back to all attendees.

Webinars – Webinars or video and audio presentations, with a Q&A component, are recorded and archived on the SFCJPA's website for future reference. Brief webinars, focusing on one topic, are coordinated, promoted via newsletters, email distributions or social media posts, with moderate staff time and effort. Staff may choose to conduct the presentations themselves or find experts to make presentations. The SFCJPA has found webinars to be an effective communication tool. In the future, webinars will continue to be used to inform and engage community members on a variety of topics.

Project Update Community meetings – Meetings and presentations specific to project updates are an important mechanism for informing community members and stakeholders who have a direct interest in the activities associated with a project, or phase of a project. In situations where project neighbors may be negatively impacted by project activities, informing community members of what to expect, what actions the SFCJPA and its contractors are taking to mitigate or minimize negative impacts, and who to contact with questions or concerns, can go a long way in alleviating community member's concerns or mistrust over project activities. One possible element of Project Update Community meetings may include project walk-arounds and tours of project elements, providing community members and stakeholders an opportunity to see the project in context.

One-on-One calls or meetings – Personal outreach to community members and stakeholders may be time-intensive but is an essential tool for building understanding between SFCJPA staff and community members and stakeholders.

Tours – As part of project updates, or as stand-alone activities, tours for community members and stakeholders provide an opportunity for staff to explain our projects in the context of the natural and human ecology of the San Francisquito Creek and the Bay margin.

Other meetings

CEO & City Manager's Meetings – These regular meetings, held approximately every two months, enable the SFCJPA to brief member agency staff leadership on the status of the SFCJPA's work.

San Francisquito Creek Multi-Agency Coordination for Emergency Planning/Public Safety (MAC) – A MAC group and associated operations plan was formed in 2015 to facilitate a common flood and severe weather response for San Francisquito Creek that historically has impacted each member. The SFCJPA supports the MAC, which was composed of the following stakeholders in 2019; but other members may be added as indicated:

- City of East Palo Alto
- City of Menlo Park
- City of Palo Alto
- County of San Mateo
- County of Santa Clara
- Menlo Park Fire Protection District
- Valley Water
- SFCJPA
- Stanford University
- CalFire

The MAC Operations Plan is developed and maintained by the Palo Alto Office of Emergency Services (OES), as the chair of the MAC group. The plan describes coordination between member agency emergency operations staff and typically includes an annual briefing and table-top exercise to test the concepts and mobilization activities, as well as an After-Action Review of the Plan with stakeholders.

Engaging volunteers and building educational partnerships – The SFCJPA has a long history of supporting volunteer activities, including educational, community and other outreach activities. We have supported educational research projects related to the Creek, promoted creek advocacy, and support many community events such as Bay Day, Earth Day, and Coastal Cleanup.

Volunteer opportunities have included:

- Tabling events and coordinating or presenting webinars
- Providing content for newsletters, blogs, and photographs or featuring the Creek or Bay margin on the SFCJPA website and/or in newsletters
- Promoting and coordinating community tours of various aspects of the creek and bay margin

The SFCJPA has supported high school and college internships. Interns are an option when funding can be secured to support paid, short-term, focused engagements. The SFCJPA has supported educational partnerships with local schools, colleges and universities.

In the future, we may expand our presence in the community through additional coordination of volunteer support, as the Creek provides a rich opportunity for local community members, learners, and educators.

7. Advocacy

As a government agency, there are limitations on advocacy. The agency may advocate for its interests before local, State, and federal legislatures, but is limited in its scope to advocate to community members and stakeholders. Education takes the place of advocacy in all communications to community members and stakeholders. There are also targeted educational opportunities including community events described above as part of SFCJPA outreach activities. In addition, the SFCJPA routinely coordinates with staff of local, State, and federal elected representatives to brief them on SFCJPA projects, progress, and issues. Elected representatives can play a key role in the success of SFCJPA projects, so ensuring their staff members are well-informed is important.

Education – All elements of the community and stakeholder engagement can be described as education. Regarding building support for the long-term success of the SFCJPA, certain ideas or messages are important to instill, such as the importance of stream-side property owner stream stewardship or elevating the importance of long-term funding for urban stream and bay margin flood mitigation and resilience projects.

To convey these messages, and any other timely priorities, SFCJPA Board and Executive Director may engage local elected representatives, regularly brief member City Councils and our County Supervisors and inform local candidates about SFCJPA projects.

Advocacy – The Executive Director and SFCJPA Board may engage in advocacy before local, State, and federal legislative bodies on issues of importance to the SFCJPA.

Advocacy may take the form of support letters, participating in advocacy coalitions, meeting with individual policymakers to make the SFCJPA's case, or providing written or verbal testimony to committees or other bodies of elected or appointed officials.

In the future, the Board, and staff of the SFCJPA might choose to identify a specific set of policy issues and positions to facilitate advocacy engagement.

Access to funding and funding sources will be a relevant issue for the life of the SFCJPA. Advocating for funding sources such as bond measures that provide flood risk mitigation, environmental restoration and stewardship, are issues the SFCJPA should strongly support and be engaged in.

8. Funding

The SFCJPA has two funded components: operations and projects. Operations are funded through annual contributions from its five constituent members. Projects have been funded through a combination of funding from Valley Water's Safe Clean Water and Natural Flood Protection Program assessment revenues, additional contributions from member agencies, grant funding from the Department of Water Resources, State Water Resources Control Board, the Army Corps of Engineers, and other sources. The SFCJPA developed a funding roadmap for the Reach 2 Upstream project. This roadmap will consider a broad range of funding options, including near and long-term funding strategies, which will include some or all the options described below.

Although not a funding mechanism, the Protecting the Bay Working Group is working to quantify flood protection benefits of wetlands, and has included the SFCJPA's SAFER Bay project for an assessment of the flood risk reduction benefits of salt marshes, and their subsequent development of climate finance mechanisms. The goal of this group is to lower insurance premiums for flood prone areas by incorporating the flood protection value of natural infrastructure, such as wetlands and marshes. This working group consists of local stakeholders (San Mateo County Supervisor Dave Pine, Flood and Sea Level Rise Resiliency District, San Francisco Estuary Institute) and others focused on flood risk mitigation and natural infrastructure statewide (California Department of Insurance, California State Coastal Conservancy) and globally (TNC, Swiss RE).

Operations funding – The SFCJPA's operations funding comes from member contributions. Annual budgets are provided to the Board for consideration. Approved budget amounts are divided evenly among the five member agencies. These contributions pay for all shared costs: salaries, benefits, office and operations, etc.

Sponsorships are one possible additional operational funding source. These are potential gifts given directly to the SFCJPA to support specific operational purposes or activities. Typically, sponsorships are sought from private or corporate donors, who believe the purpose of the donation also helps them in some way. Such donations may be tax deductible charitable contributions for private or corporate donors. Sponsorships might support elements of the SFCJPA's operations, such as paying an internship stipend, covering the costs to host a special event, or for the creation of a publication. Sponsorships might also be sought for ongoing ecosystem stewardship, recreational facilities, and their maintenance. These activities are associated with projects but are themselves not capital projects.

Project Funding **-** The SFCJPA will continue to seek local and state contributions while also evaluating new funding opportunities.

Potential future funding mechanisms for projects include expansions of existing mechanisms, such as state agency grants funded through revenue bonds. Future revenue bonds may include a Statewide Climate Resiliency Bond measure, which may be on the ballot in the next couple of years. This, and similar bond measures that provide flood risk mitigation, environmental restoration and stewardship are issues the SFCJPA should strongly support and be engaged in.

Member contributions – the SFCJPA's members may choose to contribute funding or to provide collateral for low interest rate loans for project construction.

Cash or In-Kind match – Projects seek grant funding from State or federal sources. Many of these grants require matching contributions. Traditionally, local governments applying for grants provide these matching funds. However, receiving matching funds, either cash or in-kind, demonstrates a strong local commitment to the project and in the case of the SAFER Bay BRIC grant, was a significant factor in the grant's award. The SFCJPA will continue to seek in-kind or cash contributions for project grants where appropriate.

Philanthropy/Capital Campaign – Non-profit organizations such as museums, zoos or charitable organizations sometimes fund large investments in capital facilities through capital campaigns. These are well-organized, targeted fund-raising campaigns, seeking donations to fund large capital projects. While it may be unusual for a local government agency to conduct a capital campaign to fund projects such as creek channel modifications, flood detention basins, or bay margin levees, it is an option to consider.

General Parcel Taxes – This mechanism funds the Safe Clean Water and Natural Flood Protection program implemented by Valley Water. This provides a predictable, long-term revenue stream, which Valley Water apportions based on number of parcels and flood risk mitigation project needs. In November 2020, Santa Clara County voters approved a permanent extension of the Safe, Clean Water and Natural Flood Protection Program.

Parcel taxes may be assessed by a JPA, including the SFCJPA. According to California law, these parcel tax assessments must be approved by a vote of two thirds.

Community Facility or Benefit Assessment District – Community Facilities Districts, or Benefit Assessment Districts can be established by local governments as a means of obtaining additional public funding to pay for public works and some public services. Assessment Districts are a "property tax" mechanism and are established for a specific geographical area receiving a special benefit from specified public improvements and services. There is a small benefit assessment district on the San Mateo County side of the creek, which contributes some revenues to the SMC FSLRD revenues. This approach may be an effective mechanism for raising revenues from property owners impacted by creek flooding and sea level rise in the future.

The SFCJPA evaluates all potential grant funding, particularly for our R2 and R3 projects.

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Glossary

This glossary is intended to assist the reader with words that they may not be familiar with, especially as they relate to San Francisquito Creek.

Alluvial fan- a triangle-shaped deposit of gravel, sand, and smaller pieces of sediment, such as silt. These unconsolidated deposits, or alluvium, are left by flowing streams. Alluvial fans are typically thicker close to streams and thinner at the outer edges.

Groundwater in the alluvial fan formed by San Francisquito Creek forms a productive aquifer known as the San Francisquito Creek Cone (named for the general cone shape).

Anadromous- is the term that describes fish born in freshwater who spend most of their lives in saltwater and return to freshwater to spawn, such as salmon and some species of sturgeon**.**

Arundo- (Arundo donax) is a non-native invasive grass that grows up to 25 feet tall along the edges of creeks and canals. It clogs channel capacity and increases flooding. The SFCJPA completed an eradication project along San Francisquito Creek and continues to monitor the area.

Bankfull- The water level, or stage, at which a stream, river or lake is at the top of its banks and any further rise would result in water moving into the flood plain. It may be identified by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Beneficial Uses- As defined in the California Water Code, beneficial uses of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

The beneficial use category is related the California's water quality protection goals. For water with multiple beneficial uses, the beneficial use with the higher level of protection is used.

cfs - cubic feet per second**,** a measure of flow velocity

Emergent groundwater- Sea level rise (SLR) will cause shallow unconfined coastal aquifers to rise. Rising groundwater can emerge as surface flooding and impact buried infrastructure, soil behavior, human health, and nearshore ecosystems. Higher groundwater can also reduce infiltration rates for stormwater, adding to surface flooding problems. Levees and seawalls may not prevent these impacts.

Engineered stream bed material- (ESM) this is a mix of boulders, cobbles and pebbles used to stabilize creek bottoms and banks. The mix is site-specific and depends on stream hydraulics and design criteria. The rocks are strategically emplaced to minimize scour, largest to smallest, tamped into place, and then covered with sand to minimize movement within design parameters.

ESM looks and functions much like a natural stream bed and has already been used in San Francisquito Creek in the Bonde Wier removal project that was completed in 2013. The SFCJPA prefers the use of ESM where possible over rock slope protection that uses uniform sized cobbles.

FEMA- Federal Emergency Management Agency, a federal agency that prepares for and responds to disasters. In 2003, FEMA became part of the Department of Homeland Security.

Freeboard-term used by the Federal Emergency Management Agency's National Flood Insurance Program to describe a factor of safety, usually expressed in feet above the 1-percent-annual-chance flood level. A detailed definition is here: https://www.fema.gov/glossary/freeboard

Flashy- Stream that rapidly collects flows from the steep slopes of its catchment (watershed) and produces flood peaks soon after the rain that subside rather quickly after the cessation of rainfall. San Francisquito Creek is considered to be a flashy creek.

Groundwater - Water held underground in the soil or in pores and crevices in rock. that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater originates from rain and from melting snow and ice and is the source of water for aquifers, springs, and wells.

Hyporheic Zone- The hyporheic zone is defined as a subsurface volume of sediment and porous space adjacent to a stream through which stream water readily exchanges. Although the hyporheic zone physically is defined by the hydrology of a stream and its surrounding environment, it has a strong influence on stream ecology, stream biogeochemical cycling , and stream-water temperatures. Sometimes the hyporheic zone is referred to as the gut biome of a stream because the biota present are important to overall stream health and ecosystem function. Read more: http://www.waterencyclopedia.com/St-Ts/Stream-Hyporheic-Zone-of-a.html#ixzz7t4CpjizB

Invasive Species- nonnative plants and animals as those that were brought into our area from around the world. Some nonnative plants and animals have become pests that out compete native species and threaten California's native biodiversity and ecosystems and are termed invasive species.

Nature based solutions- FEMA defines nature-based solutions as sustainable planning, design, environmental management and engineering practices that weave natural features or processes into the built environment to promote adaptation and resilience. While FEMA uses the term "nature-based solutions," other organizations use related terms, such as green infrastructure, natural infrastructure, natural and nature-based features, or Engineering with Nature®, a program of the U.S. Army Corps of Engineers.

Overbank- Flows that exceed top of channel margins. Flood flows.

Perched Creek- A stream with a bottom that is above that of the groundwater table and thus is separated from underlying groundwater. This condition can vary seasonally and annually depending on the amount of precipitation, as well as in different sections of the same streambed. Another term for this is a losing stream because it can recharge ground water unless there is a confining layer that inhibits percolation. A gaining stream is a stream bottom that is below the top of the groundwater table and is thus directly hydraulically connected with groundwater.

Reach- San Francisquito Creek is divided into Reaches or segments based on hydrology or other parameters. Reach 1 is the most downstream reach and extends from Highway 101 to San Francisco Bay. Reach 2 begins at West Bayshore Road adjacent to Highway 101 and extends to just upstream of the Pope Chaucer Bridge, or to El Camino Real for US Army Corp of Engineers studies. Reach 2 is also known as the Urban Reach. Reach 3 is the upper watershed, with Stanford University as the primary landowner. Stanford has further defined Reach 3 as Delta and Searsville Reservoir reaches. See Figure 1.

Refugia- A natural or constructed feature that provides a resting area for animals. The San Francisquito Creek constructed five high tide refugia islands for salt marsh harvest mice and California Ridgeway's Rail to adapt to rising tides. We also installed rootwads and rock berms that provide habitat and refuge for fish in the creek. Our Reach 2 U~~u~~pstream project has incorporated similar features and includes pools and riffles for fish.

Riparian- Riparian areas are lands that occur along watercourses and water bodies. Typical examples include flood plains and streambanks. They are distinctly different from surrounding lands because of unique soil and vegetation characteristics that are strongly influenced by the presence of water. A riparian area or zone is illustrated below:

Major components of a stream or water body riparian area—Riparian areas can be symmetrical or asymmetrical in shape. The topography and hydrogeology determine the plant and animal communities associated with the width or meandering riparian area configurations.

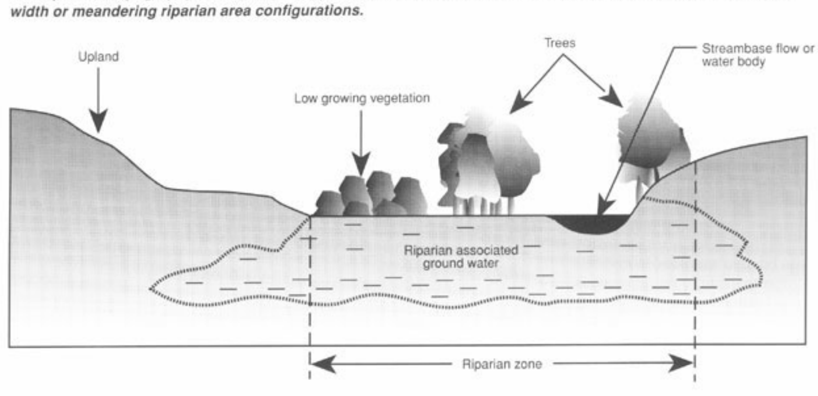

Image source: USDA, NRCS

Scour- Net removal of sediment from stream by action of water flow. Scour may be measured in volume of sediment removed from a channel reach, in average depth of sediment removal from an area, in average change of depth at a cross section, or in change of depth at a point.

Streambed scour is the mobilization/fluctuations in the vertical position of the bed of a stream as material is eroded and degrades. Some degree of streambed fluctuation is natural process; however, urban development and floodplain encroachment have resulted in excessive channel incision or bed lowering during larger flow events in San Francisquito Creek.

Salmonoid spawning success requires that deep scour of the bed does not occur during the time the eggs are incubating in gravel deposits.

Sediment- A collective term for rock and mineral particles that 1) are being transported by a fluid (sediment in transport, suspension, or motion) caused by the fluid motion or 2) have been deposited by the fluid (i.e., sediment deposits).

Sheet Pile- Sheet piles are three dimensional vertical sections, most commonly made of steel, that interlock to form a continuous wall that can hold back soil and/or water. The term sheet piling refers to any retaining wall type that is a) installed into the ground by driving or pushing, rather than pouring or injection.

Stage- The level of the water surface in a stream, river, or reservoir, measured with reference to some datum.

Stream Bank- The sloping margin of a stream or river that confines flow to the natural channel during normal stages.

Toe of Bank- The "toe" lies at the bottom of the creek side slopes or banks and supports the weight of the bank. The toe is the area that is most susceptible to erosion because it is located in between the ordinary water level and the low water level, and it is the area most affected by currents and/or storm flows.

Top of Bank- The point along the bank of a stream where an abrupt change in slope is evident, and where the stream is generally able to overflow the banks and enter the adjacent floodplain during an annual flood event. Determination of the top of bank is site specific and can vary along a bank. This determination may require a survey but is important to creek protection policies and buffers.

Total Maximum Daily Load (TMDL): An evaluation of the condition of an impaired surface water on the Section 303(d) List that establishes limitations on the amount of pollution that water can be exposed to without adversely affecting its beneficial uses and allocating proportions of the total limitation among dischargers to the impaired surface water.

Tidal/Tidal Influence- areas that are subject to the ebb and flow of tides. San Francisquito Creek is tidal in Reach 1 from San Francisco Bay to Highway 101.

Undergrounding- utility lines or piping that is moved from above ground to below ground.

Waters of the State- Defined more broadly than "waters of the United States and includes "any surface water or groundwater, including saline waters, within the boundaries of the state" (Water Code section 13050(e)). The definition is broadly interpreted to include all waters within the state's boundaries, whether private or public, including waters in both natural and artificial channels. California includes riparian area of creeks, from Top of Bank to Top of Bank, rather than mean high water as interpreted federally. This broader application stems from the Porter-Cologne Act that expands the aerial extent of the Water Quality Control Boards' authority as waters of the State. The Porter-Cologne Act also requires the Water Board to address both indirect and direct impacts of activities (including downstream impacts), as well as possible future impacts that can result in the degradation of water quality.

Waters of the United States - Very generally refers to surface waters, as defined by the federal Environmental Protection Agency in 40 C.F.R. § 122.2. On October 7, 2021, the Council on Environmental Quality proposed a rule to modify its NEPA regulations, with the final rule that became effective on May 20, 2022. These modifications essentially reinstated requirements that were removed as part of the "2020 Rule," including cumulative impacts and climate change through the emission of greenhouse gases.