

CLIMATE CHANGE ADAPTATION IN ACTION

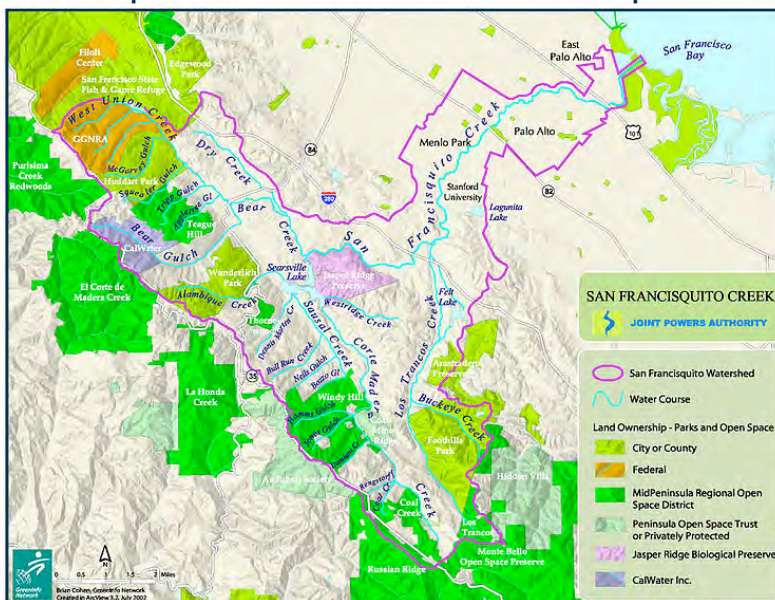
San Francisquito Creek Joint Powers Authority Factors Future Sea Level Rise Into Coordinated, Watershed-Level Flood Protection

Synopsis

Many Bay Area communities are facing increased flood risk as sea level continues to rise and storm and flooding events potentially become more intenseⁱ. Communities along the San Francisquito creek are no exception, and sea level rise stands to exacerbate existing flood protection challenges that have occurred in the past with heavy storms causing millions of dollars in damages. The San Francisquito Creek Joint Powers Authority (SFCJPA), covering a 30,000 acre watershed, has sought to address these challenges by working to simultaneously improve flood protection, recreational opportunities and habitat benefits to multiple communitiesⁱⁱ. The SFCJPA San Francisco Bay to Highway 101 flood protection project is designed to protect

against a 100-year San Francisquito creek flow event happening at the same time as a 100-year high tide event that is marked by a sea level rise of 26 inches. The SFCJPA assumed this design would be resilient for 50 years using Army Corps of Engineers standards. For this proposed project, finding common ground among all interested parties was key to incorporating innovative flood protection techniques. To address the diverse interests of the SFCJPA partners and project stakeholders, the fundamental goal is to change this waterway from one that divides multiple, neighboring communities into one that unites them around a more natural water runoff system that is less prone to flooding.

San Francisquito Watershed Boundaries and Land Ownership



Source: San Francisquito Creek Joint Powers Authority.

THE LAY OF THE LAND

The San Francisquito creek watershed covers 46 square miles and includes six towns (Menlo Park, East Palo Alto, Palo Alto, Woodside, Portola Valley, Atherton); two county flood control districts; local, state and national park sites; major rail routes and highways; a regional airport; and numerous other critical facilities. The defining natural feature of the watershed, San Francisquito creek, serves as the dividing line between Santa Clara and San Mateo counties and several cities. A perennial stream that originates in the foothills of the Santa Cruz Mountains, a diverse array of land uses occur adjacent to the creek, including protected open space, residential, light industrial and protected bay lands.

Flooding in Palo Alto February 3, 1998

Source: San Francisquito Creek Joint Powers Authority.

PROJECT MOTIVATION: THE FEBRUARY 1998 STORM EVENT

The primary impetus for creation of the SFCJPA was a record storm in February 1998, during which San Francisquito creek overtopped its banks in several areas, affecting 1,700 residential and commercial structures and causing \$26.6 million in property damages. Recent estimates by the U.S. Army Corps of Engineers predict that today a 100-year flood would cost 25 times the 1998 event.

This damaging storm led managers in the area to realize that flooding issues need to be managed at the watershed scale with coordination between cities, counties and flood protection agencies. The SFCJPA was formed a few months after this event, and began operation in 2000 with cooperation from its five member agencies (Palo Alto, Menlo Park, East Palo Alto, Santa Clara Valley Water District and the San Mateo County Flood Control District).

The Story

The project developed over a multi-year period, beginning with the conceptual analysis and alternatives analysis in 2008. During this time, the SFCJPA sought public input through presentations at community meetings and other forums. Project managers are working on the final proposal and hope to obtain approval for the CEQA document by Summer 2011. Ultimately, the project will occur in two phases. Phase 1 will include construction of new levees to deal with overflow into the Don Edwards Baylands, excavating sediments and restoring impacted areas. Overflow into the Don Edwards Baylands will be facilitated by degrading a non-functioning levee on the north side of the channel to make the project more resilient to large flow events. Construction for Phase 1 is expected to begin in Fall 2011 and to cost approximately \$10 million. Phase 2 of the project will include construction of flood walls and will likely exceed the cost of Phase 1.

The project area is at high risk for severe flooding from both fluvial (stream flows from the watershed) and tidal sources. In addition, the creek runs through communities that experienced considerable damage and dislocation from previous flood

events. The downstream flow capacity of the creek must be increased before flood protection measures further upstream can be implemented. In addition, lowering the water surface elevation through the lower reaches of the creek has positive drainage effects upstream even before the upstream projects are constructed.

The SFCJPA project sought to include protection against flooding from 100-year creek flows coincident with tidal influence and taking into account sea level rise. The criteria were determined based on the National Research Council's "Responding to Changes in Sea Level: Engineering Implicationsⁱⁱⁱ." This publication prepared three data curves (most extreme to least extreme) to estimate sea level rise in San Francisco Bay. The most extreme curve also matches up with more recent studies showing predicted sea level rise for California, including the California Energy Commissions' Climate Change Center projections for the San Francisco Bay Area. Estimates from these sources project a 26 inch sea level rise occurring within 50 years^{iv}. These two sources provide the basis for the standards used for protecting against future sea level rise in the SFCJPA's project design.

Sea level rise is just one of a number of hazards that coastal communities will likely be exposed to as a result of climate change. Increased intensity of storms, for example, could exacerbate the impacts of sea level rise in flood prone areas. For this project, choosing the most conservative approach of designing to the 100-year creek flow concurrent with 100-year tide and sea level rise will help to remove properties from the floodplain and protect them from the cumulative impacts associated with climate change. Flood protection will be achieved by the following SFCJPA proposed methods:

- Widening San Francisquito creek to allow for 100-year storm events
- Removing an abandoned structure to allow flood flows from the creek channel into the Palo Alto Baylands Preserve
- Restoring a natural mouth to a portion that was channelized over 50 years ago
- Constructing an outlet structure for Caltrans' enlargement of the Highway 101/East Bay shore Road Bridge over San Francisquito creek

Additional benefits of the proposed measures include creation of several acres of new tidal wetland habitat.

The new tidal wetland habitat will:

- Enhance local ecosystems
- Create new habitat for endangered species
- Reduce erosion and runoff into the creek
- Improve habitat connectivity between the creek and surrounding Baylands
- Enlarge the bay/creek interface to improve the transition for steelhead migrating between saltwater and freshwater environments

In order to keep pace with sea level rise, sediment deposition from fluvial sources could potentially increase the elevation of tidal wetland habitat over time. For specific projects, it is impossible to know the rate at which increasing the elevation of tidal wetlands will mitigate for sea level rise, so adaptive management practices need to be incorporated to most effectively maintain habitat functionality over time.

Another benefit of this project to many community members in Palo Alto and East Palo Alto is that it may allow some residents to be removed from FEMA flood maps and the flood insurance program because it provides improved flood protection to these communities. Finally, by creating new and improved access and trails along the creek and San Francisco Bay, the project enhances recreational opportunities within the watershed.

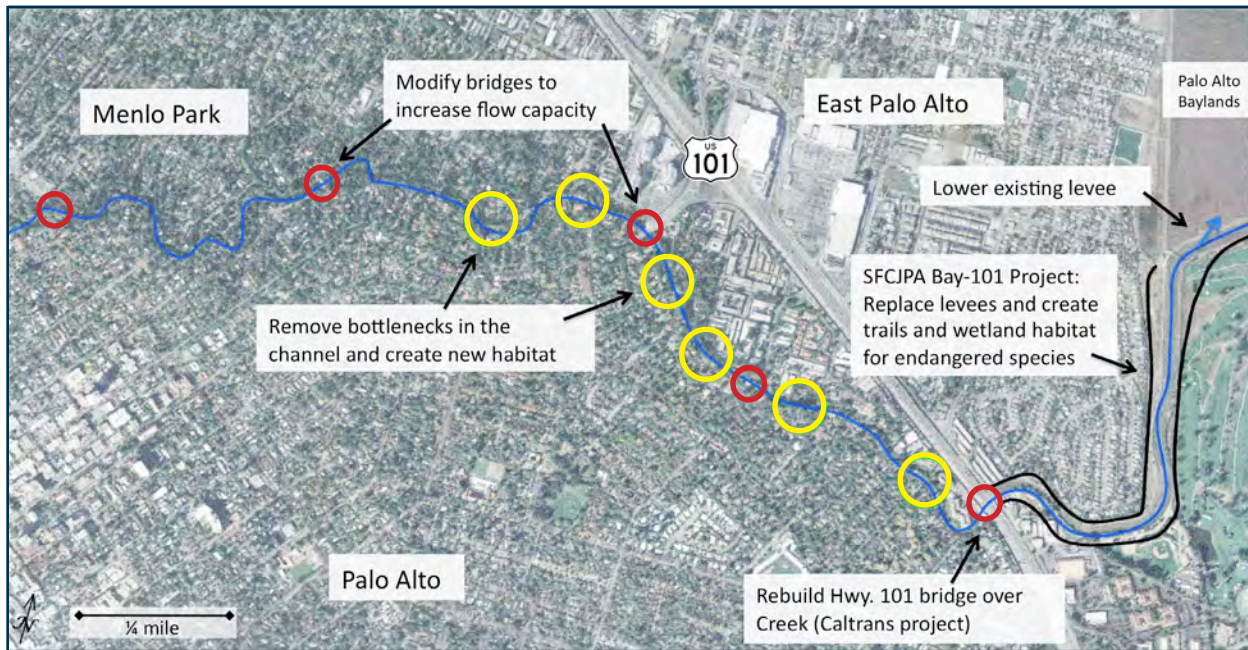
STAKEHOLDER INVOLVEMENT

Relying on existing working relationships and partners, as well as public outreach at community meetings and city councils, the SFCJPA sought broad support for the project. Following completion of a conceptual analysis of project alternatives and preliminary design, numerous public meetings were held to seek stakeholder input and support. Community members were most interested in:

- **Recreational opportunities offered by the project**
- **Flood protection benefits**
- **Protection of endangered species including the steelhead trout**

This input was incorporated into designs to reflect the priorities of the communities that would benefit from the project.

Key Project Elements



Source: Len Materman, San Francisco Bay to Highway 101 Project.

Lessons Learned

After the flood of 1998 that caused serious damage to many properties in all jurisdictions, it became apparent that better coordination between agencies was needed to protect residents. Strong working relationships and leadership was key in facilitating the process for the SFCJPA. In addition, designing to high flood protection criteria requires continued buy-in and support from elected officials, staff and stakeholders. Identifying common interests among all parties allowed project managers to effectively design flood protection for communities that is also resilient to possible future sea level rise. This awareness enabled the SFCJPA to work across jurisdictional boundaries and develop a project that addresses a large part of the watershed system that could be affected by flood events. According to Len Materman, Executive Director of the SFCJPA,

It's everyone's responsibility to provide flood protection...you can't solve an erosion problem if you only shore up one side of the issue. You can't build a flood wall on one side and have it overtop on the other side.

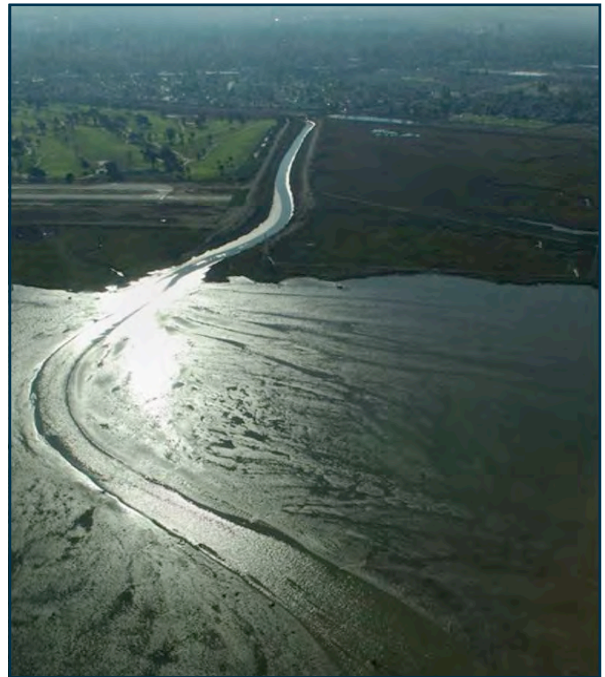
The SFCJPA has built momentum around the San Francisco Bay to Highway 101 project. Working with five jurisdictions to find common ground and shared objectives can be challenging and time-consuming. This is particularly true when flood protection efforts are scaled up to the watershed level to solve flood protection and climate change challenges. Still, Materman explains, "not only is it the right thing to do...it's doable." Being able to work at the watershed level to improve flood protection means that residents are safer and communities are more resilient to flooding impacts, which are likely to increase with sea level rise and greater storm events in the area.

Looking Forward

Next steps for the project include forging a funding agreement with available resources to begin construction in late 2011, and then taking the project to the voters to continue constructing the project upstream. When completed, this project will provide increased flood protection for 5,500 properties in East Palo Alto and Palo Alto communities along a flood-prone section of San Francisquito creek downstream of U.S. Highway 101.

The SFCJPA is also exploring additional flood protection strategies such as improving flood protection at levees north of the San Francisquito creek and up to the Dumbarton Bridge. Getting additional buy-in for expansion of the project requires that the public understand the connection between flood protection, sea level rise and development choices and that dealing with these issues now will save costs and prevent disaster in the future.

San Francisquito creek Entering San Francisco Bay



Source: Len Materman, San Francisquito Creek Joint Powers Authority.

Sources

ⁱ Heberger, M., Cooley, H., Herrera, P., Gleick, P.H., Moore, Eli. (May 2009). *The Impacts of Sea Level Rise on the California Coast*. California Energy Commission, PIER Energy-Related Environmental Research. CEC-500-2009-024-F

ⁱⁱ SFCJPA (July 27, 2009). *Critical issues and questions regarding JPA Capital Projects*. Accessed: <http://www.cityofpaloalto.org/knowzone/news/details.asp?NewsID=1353&TargetID=215>

ⁱⁱⁱ National Research Council. (1987). *Responding to Changes in Sea Level*. Committee on Engineering Implications of Changes in Relative Mean Sea Level, Marine Board.

^{iv} Knowles, N. (2009). *Potential Inundation Due to Rising Sea Levels in the San Francisco Bay Region*. The California Climate Change Center.

Who We Are

This case study was developed through a state-federal partnership of the San Francisco 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. These agencies are working together to provide information resources and technical assistance to support local governments in planning for climate change impacts.

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For More Information

For more information on the San Francisquito Creek Joint Powers Authority Bay to Highway 101 project, check out their website: www.sfcjpa.org. General information on climate change adaptation planning and educational opportunities can be found at:

http://www.bcdc.ca.gov/planning/climate_change/adaptation.shtml

<http://collaborate.csc.noaa.gov/climateadaptation/default.aspx>

<http://www.sfbaynerr.org/training/>