

# Options for Financing the Restoration of San Francisco Bay Wetlands

## EXECUTIVE SUMMARY

of a white paper by the

Bay Area Council Economic Institute

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# Executive Summary

This analysis summarizes recent reports on wetlands restoration and finance in the San Francisco Bay Area, identifies options for financing wetlands restoration, and assesses which option or options appear most feasible. It is presented as a framing document for policymakers and other Bay Area leaders in considering legislation or other initiatives to meet regional wetlands objectives.

San Francisco Bay is the largest estuary on the West Coast and is home to 500 wild-life species, of which 128 are threatened or endangered. The Bay provides a resting spot for migratory birds and spawning grounds for fish. Its wetlands absorb and filter agricultural, industrial, and urban runoff (equal to about 70% of Bay pollution) before it reaches the Bay and buffer against high tides and storm surges, providing protection against flooding and erosion. Wetlands also capture carbon, mitigating greenhouse gas emissions. Beyond their ecological value and positive role in adaptation to rising sea levels, the Bay's wetlands also have important aesthetic value and provide significant recreational opportunities.

Bay wetlands have been diked, filled, and developed to the point that the Bay is one-third the size it was historically, with less than 10% of its original wetlands remaining. In the 1800s, large sections of Bay shoreline were diked with levees to enable various kinds of development, most notably commercial salt production in huge evaporation ponds. Development has brought residences and businesses closer to the water's edge in low-lying shoreline areas and near waterways that feed the Bay. In parts of the South Bay, groundwater extraction has caused subsidence, as a result of which some diked areas are now below high tide level. With a significant part of the South Bay and parts of the North Bay within the 100 year flood plain, and sea level rise predicted, restoring wetlands and improving flood protection will be critical to protecting communities surrounding the Bay.

To date, wetlands restoration has been primarily financed with a mix of state and (predominantly) federal funds, as well as private resources. The California Coastal Conservancy and San Francisco Bay Joint Venture have led this effort. With the

recent creation of the San Francisco Bay Restoration Authority, a vehicle now also exists to generate additional funds at the regional level.

In the past decade, the amount of San Francisco Bay shoreline acreage acquired for wetland habitat restoration has greatly expanded. The 40,000 acres of wetland habitat currently fronting the Bay account for 80% of total wetlands remaining in California. There is broad agreement among government agencies, conservationists, hunting and fishing enthusiasts, and community groups that an additional 60,000 acres should be restored in order to sustain a healthy Bay ecosystem. Of that, 36,000 acres have been identified and acquired.

Three categories of cost are associated with wetland restoration: acquisition; construction; and operation/maintenance (OM) and monitoring. Acquisition and construction are one-time costs. Among many things, construction involves planning, design and permitting; building new levees and raising old ones; grading of ponds and removal of salts or other potentially harmful sediment; reinforcing transitional slopes connecting to upland areas; installing drainage, pumps, valves, pipes, filters, fish screens and other water control structures; transporting equipment and materials; moving rail beds, power lines and other infrastructure as needed; grading or paving the tops of levees; and installing benches, lighting and signage for public access. OM costs are ongoing and typically involve maintenance and management of public areas; repair and replacement of equipment and amenities; monitoring; removal of vegetation and invasive species such as spartina; and vector control (mosquito eradication).

Active concern with San Francisco Bay wetlands restoration dates back to the 1970s, with restoration of Faber Tract (1972), Alameda Creek Pond 3 (1975), Muzzi Marsh (1976) and Warm Springs (1986). Momentum increased with the creation of San Francisco Bay Joint Venture in 1994. Since 2006, stakeholders have focused renewed attention on identifying stable, reliable funding sources for restoring the wetlands that have come under public control, particularly by state and federal conservation agencies whose mandates and responsibilities have increased dramatically while budgets and staffing have stagnated. In 2009, Governor Schwarzenegger signed AB 2954, establishing the San Francisco Bay Restoration Authority, to raise

and receive funds from public and private sources to close the funding gap for restoration on properties already acquired and to explore future acquisitions.

The following studies, papers and data sets, all developed since 2006, identify existing and potential wetland restoration projects; the scope of work required; long-term 50-year and short-term three-to-five-year costs; and additional Bay planning and study required in the future.

## Comprehensive Restoration Studies

### *Greening the Bay: Financing Wetland Restoration in San Francisco Bay* *Save The Bay, 2007*

This document frames the broad policy discussion regarding the financing of wetland restoration around San Francisco Bay. It lists the major wetland projects fronting the Bay shoreline and establishes the most comprehensive estimate of long-term project costs: \$1.43 billion for 13 projects over 50 years, including acquisition, construction and OM. This is in addition to \$370 million already invested (\$254 million for acquisition and \$116 million for planning, construction, study and operations/maintenance).

It outlines the benefits of wetland restoration and the principal challenges to restoration efforts: inadequate budget and staffing to manage 33,000 acres in acquisitions placed under state and federal management; lack of centralized monitoring of project and funding status; and absence of a formal regional authority established to raise, receive and distribute funds from new sources. (This last challenge has been addressed with the creation of the San Francisco Bay Restoration Authority in 2009.)

Save The Bay recommends tapping a greater share of funds from applicable state resource bonds and from local water quality, waterfront/habitat restoration and public access measures; and it calls for increased funding of the San Francisco National Wildlife Refuge Complex, which includes the South Bay Salt Ponds, Bair Island, Skaggs Island and Cullinan Ranch.

*San Francisco Bay Restoration Authority Funding Options Report*  
Save The Bay, July 2009

Save The Bay commissioned this report by SCI Consulting to advise the newly-created Restoration Authority on dedicated funding streams it might pursue and administer.

SCI recommends a blended approach with a parcel tax at its center, based on the conclusion that a parcel tax can raise the most money with the greatest flexibility in uses of the funds and the least legal or political uncertainty. Two-thirds voter approval would be needed; a 2006 poll showed 83% of voters willing to pay \$10 annually for wetland restoration and conservation.

The report offers three parcel tax scenarios (\$4, \$8 and \$15 annually) and assesses the potential revenues across the Bay Area counties' combined 1.74 million taxable parcels. Potential revenues range from \$7.0 million to \$39.2 million.

Even at the high end, a parcel tax would not fully close the long-term restoration funding gap. SCI recommends supplemental funding raised through a combination of future state bonds; various user, regulatory and development impact fees; and private gifts and grants.

*Funding Needs for Ready to Go or In Progress Tidal Wetland Projects in San Francisco Bay*  
San Francisco Bay Joint Venture, September 2010

San Francisco Bay Joint Venture (SFBJV) tracks viable wetland projects in the nine Bay Area counties—whether on the Bay or not—that are slated for, or are in the process of, restoration. Its assessment includes total acreage, acreage scheduled for restoration, lead agencies and organizations for each project, and estimated unfunded costs over 3–5 years. This analysis specifically identifies 23 projects fronting San Francisco Bay, totaling 19,086 acres, with unfunded costs estimated at \$127.4 million.

Some new sites are expected to come onstream and perhaps get funded sooner—for example, the 3,600-acre Skaggs Island site in the North Bay being transferred

from the U.S. Navy. SFBJV has information in its database from lead partners about specific sites for future projects, but the data isn't firm.

## South Bay Salt Pond Studies

### *South Bay Salt Pond Restoration Project: Updated Preliminary Cost Estimate September 2006*

This study lays out the potential scope of work to restore three South Bay salt pond complexes—Alviso in Santa Clara County, Ravenswood in San Mateo and Eden Landing in Alameda, together covering more than 13,000 acres. It outlines two restoration scenarios—one with 50% tidal restoration and 50% managed ponds (Alternative B); and a less expensive scenario with 90% tidal restoration and 10% managed ponds (Alternative C)—measured against a baseline of no action (Alternative A).

Total projected costs for construction and OM, including a 50% contingency to allow for uncertainties regarding site conditions and other variables, is \$108 million for Alternative A, \$650 million for Alternative B, and \$657 million for Alternative C.

### *South Bay Salt Pond Restoration Project Phase 1 Funding and Construction Status Update, September 2010*

Phase 1 refers to seven initial funded projects in the three South Bay salt pond complexes. Five are fully funded and scheduled for completion by mid 2011. The remaining two have portions of their funding identified but not yet finalized, or face cost uncertainties but are scheduled for completion by 2013. Phase 1 project costs total \$38.2 million, 75% currently funded and the remainder with funding identified and approvals pending.

[Note: In the absence of more planning and study, assessments regarding scope of work and restoration costs of South Bay salt pond non-Phase 1 wetland sites are still considered moving targets in terms of scope of work and costs.]

## Flood Control and Related Issues

*South Bay Salt Pond Restoration Project:  
Flood Management and Infrastructure Existing Conditions Report*  
March 2005

*South San Francisco Bay Shoreline Flood Risk Management Feasibility  
Study: Without Project Economics Draft Errata/Update Report*  
U.S. Army Corps of Engineers (USACE), August 2010

*Preliminary Study of the Effect of Sea Level Rise  
on the Resources of the Hayward Shoreline*  
for Hayward Area Shoreline Planning Agency, March 2010

Flood hazard exists in two forms: tidal flooding from the Bay itself, whether from wave action in normal seasonal conditions or from tidal surge during storms; and flooding from inland runoff, particularly during rainy periods, as streams and creeks swell and runoff meets with urban and suburban stormwater and water treatment plant overflow.

Development has also encroached on creek banks, adding to erosion. While maintenance costs have risen, property taxes that funded county water and flood districts have been curtailed under Proposition 13 and subsequent measures. Most flood control districts today are fighting a holding action in meeting their flood channel maintenance obligations, with dredging and other big-ticket costs deferred.

As a result, in the shoreline fronting the Bay, flood channels now back up more quickly. Over time, rising tide levels and increasing storm severity will begin to overtop levees unless they are both raised and reinforced. As water levels in the Bay rise over the



next 50–100 years, the cost of maintaining existing infrastructure—and the risks and cost of doing nothing—will increase.

The challenges are most acute in the South Bay. Some 15,000 acres of former salt pond properties, ringing the Bay on both sides from Highway 92 south, were transferred from private ownership to state and federal conservation agencies in 2003, with the goal of restoring most of the ponds to tidal wetland habitat. With that transfer has come responsibility for, at minimum, maintaining the level of flood protection provided by the original salt pond levees and structures. The California Department of Fish and Game and the U.S. Fish and Wildlife Service have not seen proportionate increases in staff and budget to adequately manage the ponds, let alone undertake improvements.

Current bayside (“outboard”) levees do not meet federal engineering flood prevention standards as enforced by the Federal Emergency Management Agency (FEMA), which administers the National Flood Insurance Program. Over time, it is expected that rising tide levels and increasing storm severity will begin to cause regular overtopping of existing levees, unless they are both raised and reinforced, at considerable cost. Any other change to existing conditions, such as breaching the outboard levees to restore tidal marshes while reinforcing inland (“inboard”) levees for flood control, would trigger stricter FEMA engineering certification standards designed to protect against a “100-year flood” (i.e., a flood with a 1% chance of occurring in any given year over a century). Meeting FEMA standards, as written and applied to a project of this size and scope, would almost certainly be cost-prohibitive. To the extent that the defined floodplain expands inland, land uses could be restricted, more properties could be required to take out flood insurance, and insurance premiums could rise.

Under current federal law, the U.S. Army Corps of Engineers participates in federally-funded flood control projects—with funds expressly authorized by Congress—and is tasked with finding the least cost, most environmentally acceptable engineering solution. Projects must have significant national, state or regional economic benefit and are ranked based on cost-benefit analyses. The Corps also implements wetland restoration projects that are not subject to cost-benefit analysis.

Cost-benefit analyses are likely to show that some salt pond areas warrant federal engineering and funding support more than others, meaning that some areas of the Bay will neither be restored as wetlands nor have their existing levee infrastructures hardened unless local, regional or state funding sources can be identified. Where such funding sources are not forthcoming, policymakers will face difficult land use choices regarding both existing and future development.

## Costs and Benefits

The cost of protection is substantial, but so is the cost of inaction. An August 2010 U.S. Army Corps of Engineers draft report estimates potential flood damage to South Bay structures and contents (including vehicles) over 50 years and at differing amounts of sea level rise. It finds that 1,149 structures are currently at risk of significant flood damage; 1,973 will be at risk by 2067 assuming a historical rate of sea level rise (.34 feet); 2,118 will be at risk by 2067 with a forecast rise of .72 feet; and 3,754 will be at risk by 2067 if sea level rises 2.13 feet. While most of these are residential structures, commercial structures have twice the structure and content value of residences. Detailed estimates of the anticipated costs of flooding will be available when the final report is released in mid to late 2011. These numbers, which are likely to be substantial, will cover damage to structures and their contents, but not emergency costs or lost business revenue.

More recent study of the flood control potential of restored tidal wetlands at the Hayward Shoreline indicates that 100-year flood protection from a restored wetland solution would cost in the range of \$216–289 million or \$304–405 million for a traditional engineered solution of heightened, reinforced levees.

These costs were estimated in 2010 dollars to meet an assumed 55-inch sea level rise by the year 2100. In this scenario, the shoreline would be allowed to move inland, an approach that would modify the existing shoreline and existing wetlands to allow them to accommodate higher sea level rise within the existing footprint. This strategy might also impose limits on future land uses within the designated area.

ESA PWA is in the process of preparing an additional analysis for the Bay Institute that will examine tidal and fluvial flood control benefits from specific wetlands restoration projects around the Bay. It will include economic benefits, including estimates of avoided costs from a restored wetland versus an engineered approach (levees or berms, flood channel dredging, etc.). Consultants expect the report to be completed by mid to late 2011.

## Other Documents and Studies Relating to Wetlands

*Living with a Rising Bay: Vulnerability and Adaptation  
in San Francisco Bay and its Shoreline*

San Francisco Bay Conservation and Development Commission, April 2009

*The Impacts of Sea Level Rise on the California Coast*

California Climate Change Center, May 2009

*2009 California Climate Adaptation Strategy*

California Natural Resources Agency, 2009

These documents discuss long-term shoreline planning and wetland issues in the context of potential sea level rise due to climate change.

## Restoration Costs Summary

The following table summarizes regional restoration costs derived from five of the reports mentioned above. The numbers vary from study to study, based on variables such as timelines, the scope and geography of the projects being analyzed, and whether or not operations and maintenance costs or other contingencies are included. In some cases, the estimates are for a range of options. The most comprehensive figure is the \$1.43 billion estimate from Save the Bay.

### ***Regional Wetlands Restoration Estimated Costs***

<b>Source</b>	<b>Scope</b>	<b>Projects</b>	<b>Time</b>	<b>Cost</b>
<i>Greening the Bay: Financing Wetland Restoration in San Francisco Bay Save the Bay, 2007</i>	Bay Area Region	30	50 yrs.	\$1.43 billion
<i>Funding Needs for Ready to Go or In Progress Tidal Wetland Projects in San Francisco Bay San Francisco Bay Joint Venture, September 2010</i>	Bay Area: Projects Slated or Underway	23	5 yrs.	\$127.4 million
<i>South Bay Salt Pond Restoration Project: Updated Preliminary Cost Estimate September 2006</i>	South Bay: Three Salt Ponds	—	50 yrs.	\$650–657 million
<i>South Bay Salt Pond Restoration Project: Phase 1 Funding and Construction Status September 2010</i>	South Bay: Three Salt Ponds, Phase 1	7	50 yrs.	\$38.2 million (funded/pending)
<i>Preliminary Study of the Effect if Sea Level Rise on the Resources of the Hayward Shoreline March 2010</i>	Hayward Shoreline	—	100 yrs.	\$243–405 million

## **Restoration Financing Options**

Bay wetlands restoration will likely require some form of regional financing.

Of the public funding mechanisms identified in the above reports, observers see a parcel tax as the most promising option, applied on either a county-by-county or (preferably) a regional basis. Analysis by the Economic Institute suggests that this has the potential to generate annual revenues of \$34–39 million, supporting bond

proceeds of \$288–\$577 million. Recent polling and focus groups conducted by the San Francisco Bay Restoration Authority suggest that while a sales tax would fall short, a parcel tax could potentially gain the necessary two-thirds voter approval.

At the state level, natural resource bonds offer the most reliable vehicle for funding. Given its current fiscal condition, however, California’s ability to float bonds may be constrained.

Private transfer fees might be considered as a source of revenues to supplement public funding. The scale of benefit would vary with the size of the developments in question, the value of the properties being conveyed, and changes in property values over time. One limitation of this option is that it would not be a resource against which bonds could be issued.

While this analysis focuses primarily on funds that could be generated from within the region and does not attempt to explore detailed strategies for obtaining funds from state and federal sources, a number of state and federal sources with the potential to significantly contribute to wetlands restoration are identified in the body of the paper.

Two possible sources—one state and one federal—should be particularly noted. A 2012 state water bond may contain funding for wetlands restoration through the California Coastal Conservancy. At this writing, no funds in the anticipated bond are earmarked specifically for the Bay Area. The bond would have to be placed on the ballot by the legislature, which has yet to occur. A water bond appears, however, to offer the best prospect for near-term funding by the state.

At the federal level, Rep. Jackie Speier introduced the San Francisco Bay Improvement Act (H.R. 5061) in 2010 to authorize \$100 million annually over ten years for the U.S. Environmental Protection Agency to fund efforts to restore and improve the environmental health of San Francisco Bay, including projects, programs and studies relating to wetland and estuary restoration and protection and adaptation to climate change. However, given the debate over federal debt levels and an unbalanced federal budget, prospects for passage are uncertain.

Several other sources that have traditionally funded wetlands restoration include the North American Wetlands Conservation Act, the U.S. Fish and Wildlife Service, the Army Corps of Engineers, the Water Resources Development Act, USEPA, and NOAA.



The costs of a failure by the region to restore its wetlands are potentially substantial. Properties at risk from flooding include commercial and industrial facilities, research parks, residences, roads, railways, airports and other key infrastructure such as electrical transmission lines, gas pipelines and water treatment plants, many of which are adjacent to wetlands. In the South Bay, flood risk is high in areas that include NASA Ames Research Center, Google, Texas Instruments, Fujitsu Corp. and other high value facilities with billions of dollars in structures and equipment. Total potential property loss in the region from a 1.4 meter rise in water levels in the Bay has been estimated at \$61.87 billion, primarily concentrated in San Mateo, Alameda, Santa Clara and Marin Counties. Income losses to businesses in floodplain areas and emergency costs further increase the costs of inaction. Direct impacts could affect 270,000 Bay Area residents, again primarily in San Mateo, Alameda, Santa Clara and Marin Counties.

In addition to their important ecological value, wetlands are an effective buffer against shoreline erosion caused by storms and tidal action—a benefit that will grow as Bay levels rise due to climate change. In this respect their value as buffers that protect key property and facilities against the effects of tides and water may exceed their value as aesthetic and recreational resources. The funding of wetlands restoration in the Bay Area—from state, federal or regional resources—therefore has significant economic implications and should be considered an important regional priority.