Annual Report

2015

BCDC's Mission: To Protect and Enhance San Francisco Bay and to Encourage the Bay's Responsible Use for This and Future Generations.

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

San Francisco Bay Conservation and Development Commission

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December 15, 2016

The Honorable Edmund G. Brown Jr., Governor
Honorable Members of the California Legislature:

SUBJECT: 2015 Annual Report

I am pleased to provide you with the 2015 annual report of the San Francisco Bay Conservation and Development Commission (BCDC), which summarizes the activities BCDC carried out during 2015 to implement the McAteer-Petris Act, the Suisun Marsh Preservation Act, the federal Coastal Zone Management Act, and the California Oil Spill Prevention and Response Act.

2015 was BCDC's 50th anniversary of protecting the Bay and promoting shoreline development consistent with Bay as a great natural resource. To celebrate BCDC's past, present and future, a summit, Sink or Swim, and a 50th anniversary celebration was held by Friends of BCDC at the Exploratorium on Piers 15-17 along the waterfront. Pictures from the Summit are included as well as *Rising to the Challenge*, a special commemorative supplement produced by the San Francisco Business Times in honor of BCDC's 50th Anniversary

BCDC continued to aggressively address the impacts of climate change, to fulfill our dual obligations to make San Francisco Bay a more productive estuarine ecosystem and to advance the economic vitality of the region that surrounds the Bay.

BCDC was established in 1965 as the nation's first state coastal management agency, as a result of the Save the Bay movement in the Bay Area to address uncontrolled Bay filling. Under the Commission's stewardship, the century-long diking, draining and filling that had reduced the Bay's size by one-third has ended. Over the past 50 years, almost 29 square miles of Bay habitat have been restored, public trails and parks have opened along 146.6 miles of the Bay shoreline, and over $20.6 billion in productive waterfront development has been built. Last year alone the Commission approved $407 million in new development, which will make almost seven and a half more miles of the Bay's waterfront available for public use and enjoyment. The projects approved in 2015 will reduce the Bay by only a tenth of an acre.

BCDC was created to prevent the Bay from shrinking due to local policies that encouraged unneeded landfill projects. Now, global warming is presenting a new challenge for the Commission. Accelerated sea level rise that will make the Bay larger threatens waterfront communities, infrastructure, businesses, and natural resources. Several years ago, to help the public understand this problem, BCDC produced maps showing the low-lying areas around the Bay that are vulnerable to flooding from sea level rise over the next century. Over 280 square miles of low-lying land are in danger of being flooded from sea level rise by mid-century and over 330 square miles will be vulnerable by 2100. The homes of over a quarter million residents, major highways, rail lines, airports and businesses worth over $60 billion are located in these low-lying areas. Since producing the maps we have been working with local, regional, state and federal partners to lead a regional response to rising sea level.

Attached to this report is a statistical summary of BCDC's 2015 work, and the following list highlights some of our most important accomplishments last year.

Strategic Plan: Staff worked to implement a far-reaching Strategic Plan including goals and objectives that was adopted by the Commission in 2013. With Executive Director and Senior Staff oversight, staff continued to work towards both broad and specific action plans to realize the Goals and Objectives. These are tied to division and individual work plans so that progress toward realizing the Goals and Objectives can be measured and reported to the Commission. While all the Strategic Plan Goals and Objectives are important, BCDC must balance new initiatives with existing activities (both elective and required). Actions on which BCDC has initially focused are:

- **DATA-DRIVEN ENFORCEMENT** (Goal 1, Objective 1): Develop and/or revise a systematic and data-driven enforcement strategy and policy to set enforcement priorities, improve compliance, improve regulatory and legal effectiveness, and use resources more efficiently.
- **EVALUATION OF PUBLIC ACCESS** (Goal 1, Objective 2): Inventory and evaluate the types and uses of BCDC-required public access that currently exists in light of current BCDC laws and policies.
- **ADAPTATION** (Goal 1, Objective 3): Partner with a variety of stakeholders to develop a Bay-wide understanding of nature-based (ecosystem) adaptation solutions, including how to best use fill to reduce the impacts of rising sea level on natural and built resources.
- **PUBLIC EDUCATION** (Goal 2, Objective 3): Develop a public information program in collaboration with public, private and non-profit organizations.
- **USE BETTER TECHNOLOGY** (Goal 3, Objective 1): Develop an information technology improvement plan to enable staff to work more efficiently and enable the public to access appropriate information.

Just as BCDC provides strong planning, regulatory, and enforcement leadership in the Bay Area, pursuant to AB 2094 (2008) the Commission continues to serve as the Bay Area's leader (and a leader internationally) in the development of a regional climate resilience and adaptation strategy with particular emphasis on addressing rising sea level.

As part of this rising sea level initiative in 2015 BCDC accomplished the following:

- BCDC continues to participate in important partnerships that leverage regional capacity to address climate change: (1) as a member of the State Coastal Leadership Group—led by the California Natural Resources Agency—coordinated coastal agency activities, including implementation of the ocean and coastal resources component of the California Climate Adaptation Strategy *Safeguarding California*; (2) continued its active partnership with the U.S. Geological Survey, which uses funding provided by the U.S. Army Corps of Engineers to study sediment transport in the Bay, which is a key process affecting how wetlands adapt to a rising Bay; (3) completed its work with the State Coastal Conservancy and several other agencies and organizations on the update of the Baylands Habitat Goals to address climate change; (4) initiated the Contra Costa County Adapting to Rising Tides project in west and central Contra Costa County, from Richmond to Bay Point, where staff and stakeholders are working together to understand the effects of current and future coastal and riverine flooding, and consequences on shoreline communities and infrastructure—including transportation and utility networks, industrial facilities and employment sites, residential neighborhoods and community facilities, and shoreline park and recreation facilities—both within and beyond the project area,

with a focus on the potential for disproportionate impacts on certain community members; and (5) completed its work with the U.S. Environmental Protection Agency and the Association of Bay Area Governments on the Housing and Community Risk project to help the region meet smart growth, resilience, sustainability, prosperity, and equity goals by developing strategies to strengthen existing housing and communities and plan smartly for future housing.

As part of its regional sediment management efforts, BCDC continued its work to identify and investigate conditions of Bay beaches, to analyze the value of these beaches. In addition, staff continued to meet with local government representatives to identify known areas of shoreline erosion or accretion. This information will inform the development of the regional sediment management strategy.

Planning

BCDC addressed the following significant planning issues last year:

- Briefed the Commission on the findings, recommendations and next steps of the San Francisco Waterfront working group's planning process, conducted in partnership with the Port of San Francisco. The working group informed BCDC staff efforts to identify alternative public benefits to those currently required in the San Francisco Waterfront Special Area Plan at Piers 23 and 27.
- Initiated the Policies for a Rising Bay Project, a comprehensive assessment of the Commission's Bay fill policies to determine: (1) how they affect shoreline adaptation proposals; (2) how they achieve the Commission's Bay protection objectives; and (3) whether changes to the policies may be needed. A stakeholder group representing interests from business, equity and environmental organizations are supporting and guiding staff work on the project, which is closely integrated with the Commission's Bay Fill Policies working group.
- Supported the work of the Commission's Rising Sea Level and Bay Fill Policies working groups to fully explore these issues, to better understand adaptation options and potential policy changes needed to pursue them.
- Facilitated preparation of Commission comments on the Bay Delta Conservation Plan (BCDP) by convening a series of panels that discussed how the BDCP may affect the Bay.
- The Adapting to Rising Tides (ART) Program. During 2015, the ART Program achieved the following milestones:
  - Completing the *Climate Change and Extreme Weather Adaptation Options for Transportation Assets in the Bay Area* project in partnership with the Metropolitan Transportation Commission (MTC), the Bay Area Rapid Transit Authority (BART), and the California Department of Transportation (Caltrans). This project identified innovative adaptation strategies for transportation assets in three focus areas within the ART Alameda County Project area. The strategies address vulnerabilities identified in the first phase of the project in the focus areas including the Bay Bridge peninsula, the Oakland Coliseum area and the State Highway 92 corridor in Hayward. Transportation assets in the three focus areas include the Coliseum area multi-modal hub, I-880, State Route 92, two critical bridges (the San Francisco-Oakland Bay Bridge and the San Mateo-Hayward Bridge), arterial and collector streets, BART, and passenger

and freight rail lines. These transportation assets are surrounded by a diversity of land use and community assets, including a wastewater treatment plant, regional parks and neighborhood businesses among others, that can benefit from adaptation strategies.

- Completed the ART Portfolio, a place to find guidance, tools and information that have been developed, tested and refined by the Adapting to Rising Tides Program to address the specific challenges of climate change. The ART Portfolio was designed to be useful to a wide variety of audiences in the Bay Area and beyond, including planners, flood managers, facilities managers, community group members and elected officials. The ART Portfolio website provides access to the planning guidance, tools, data and information developed and refined by ART Program staff based on their extensive experience and lessons learned in adaptation planning through leading and supporting numerous projects.
- Completed *Tidal Creeks and Flood Control Channels: Guidance for assessing the impacts of sea level rise* to support consistent and robust assessments of the vulnerability of tidal creeks and flood control channels to sea level rise. The guidance describes the recommended approach and encourages planners to work with flood managers to evaluate the impacts of combined coastal-riverine flooding. The guidance builds on the vulnerability assessment process developed by the ART Program and on the San Francisco Estuary Institute's (SFEI's) protocol for locating the current head of tide and predicting where this zone of tidal influence may migrate as sea level rises.
- Initiated the ART Contra Costa Project to investigate how current and future flooding may impact transportation and utility networks, industrial facilities and employment sites, residential neighborhoods and community facilities, and shoreline park and recreation facilities in west and central Contra Costa County. The consequences of flooding both within and beyond the project area are being considered with particular attention to the potential for disproportionate impacts on certain community members.
- Re-initiated the ART Oakland/Alameda Resilience Study in partnership with the Association of Bay Area Governments (ABAG) Resilience Program to assess vulnerabilities, risks and mitigation opportunities for multiple hazards—earthquakes, sea level rise, and flooding—that threaten the people, facilities, infrastructure, and community services at the Oakland International Airport, the Oakland Coliseum, the East Oakland neighborhoods around the Coliseum and Bay Farm Island.
- Provided technical assistance to: (1) the Southern Marin Vulnerability Assessment study being led by Marin County Supervisor and BCDC Commissioner Kate Sears; (2) the City of Benicia's City of Benicia Climate Change Vulnerability Assessment and Adaptation Plan; and (3) provided direct assistance to the San Mateo County Sea Level Rise Vulnerability Assessment project planners in developing a work program and vulnerability assessment approach, and designing project working group meetings.

Legislation

The Commission took a position of support on two climate change bills, both authored by BCDC Commissioner alumni:

- **SENATE BILL 246** (Chapter 606, 2015), authored by Senator Bob Wieckowski, addresses local, regional and state adaptation planning by establishing the Integrated Climate Adaptation and Resiliency Program to be administered by the Office of Planning and Research (OPR), in order to coordinate efforts at the local, regional and state levels and provide tools and support to accomplish that coordination. This would include a clearinghouse of information on adaptation. The bill also requires the Office of Emergency Services, OPR and the Natural Resources to update the *Adaptation Planning Guide* within a year of *Safeguarding California* updates. SB 246 passed the legislature and was signed into law by the Governor.
- **ASSEMBLY BILL 1482** (Chapter 603, 2015), authored by Assemblymember Rich Gordon, provides for updating every three years the *Safeguarding California* Plan, which addresses adaptation planning for state agencies. It also provides that the Plan encourage collaborative regional planning and also promotes the use of natural systems and natural infrastructure for adaptation. The bill expands the duties of the Strategic Growth Council to review the activities and funding programs of all state agencies in meeting the goals of the *Safeguarding California* Strategy. AB 1482 passed the legislature and was signed into law by the Governor.

Regulatory

The Commission issued the following significant regulatory permits, permit amendments, and federal consistency determinations in 2015:

- To the East Bay Regional Park District, adjacent to the Albany Bulb in the City of Albany, Alameda County to replace an eroding revetment and replace it with an engineered revetment, install habitat features that include bird roosting island, a pebble beach, and an oyster reef, and install an improved public trail (Permit No. 2014.005.000).
- To the Port of San Francisco, at Piers 27 and 29, in the City and County of San Francisco, to create commercial parking within the Ground Transportation Area of the Cruise Terminal, install fencing to protect maritime equipment, and provide public restrooms within the Beltline Building (Material Amendment to Permit No. 2012.002.04).
- Three sand mining permits that allow for harvesting of sand from shoals in San Francisco Bay, which is used in various construction projects in the Bay Area to support the regional economy. To address remaining data gaps about potential longterm impacts of the mining, the permitees will provide $1.2 million for scientific studies on the Bay sand budget and impacts of mining on Bay resources. The permits also include reopener clauses should any information become available that shows substantial depletion of the resource or significant adverse impacts that cannot be avoided or mitigated.
    - To Hanson Marine Operations, in the Bay, to mine up to 1,540,000 cubic yards of sand annually over a 10-year period (a total of up to 15.4 million cubic yards) and unload at existing sand terminals in the Bay

Area. Sand would be mined from various leases totaling 2,601 acres and known collectively as the "Central Bay Leases," in the Central Bay, in San Francisco and Marin Counties (Permit No. 2013.004.00).

- To Lind Marine Incorporated to mine up to 1.25 million cubic yards of sand over a 10-year period at a 534-acre lease location in Suisun Bay, in the Suisun Marsh Primary Management Area, Solano County (Permit No. 2013.003.00md).
- To Suisun Associates to mine up to 2.45 million cubic yards of sand over a 10-year period at a 367-acre lease location known as the Middle Ground Island Sand Shoal adjacent to Middle Ground Island, in the Suisun Marsh Primary Management Area, Solano County (Permit No. 2013.005.00md).

- To the City of Larkspur, in Corte Madera Creek, in the City of Larkspur, Marin County, to replace the Bon Air Bridge and install various amenities including lighting, decorative railings, and public bicycle and pedestrian pathways (Permit No. 2013.010.00).
- To the Water Emergency Transportation Authority and the City of Alameda to construct a maintenance and operations facility near Seaplane Lagoon in the City of Alameda, Alameda County, including a maintenance and administrative office building, a maintenance yard, and approximately 18,569 square feet of berthing facilities to service 8-12 vessels (Permit No. 2014.002.00).
- The Department of the Army's consistency determination for the modernization, rebuilding and maintenance dredging of Pier 2 at Military Ocean Terminal Concord (MOTCO), near the City of Concord, Contra Costa County. The project would remove 159,000 square feet of structures over the Bay that pre-date the Commission, and place 123,215 square feet of fill to build a modern pier (Consistency Determination No. C2003.003).
- The U.S. Army Corps of Engineers, San Francisco District proposed maintenance dredging of up to 5.77 million cubic yards from five federal deep water channels including: the Oakland Entrance and Inner and Outer Harbor, Pinole Shoals, Suisun Bay, and the Redwood City Harbor (Consistency Determination No. C2015.002.00).
- To Tesoro Golden Eagle Refinery to upgrade a marine terminal located in the City of Martinez, Solano County to achieve compliance with the State of California Marine Terminal Engineering and Maintenance Standards (Permit No. 2014.006.00).
- To the California Department of Transportation (Caltrans) to use controlled synchronized explosions in the demolition of a pier, which supported the former San Francisco-Oakland Bay Bridge, in the City and County of San Francisco (Permit No. 2001.008.38).
- To the U.S. Fish and Wildlife Service to construct a horizontal levee in the Bay and a 1,400-foot-long public trail at the levee separating Sears Point from the Sonoma Baylands restoration site in Sonoma County (Consistency Determination C2011.003.02).
- To the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers to construct flood control levees, place fill bayward of the levees and breach outer levees to create marsh habitat, and provide public recreational facilities at the Alviso (Salt) Pond Complex in the Don Edwards San Francisco Bay National Wildlife Refuge in Santa Clara County, and at land owned by the City of San Jose, Santa Clara County (Consistency Determination C2015.006.00).

The Commission resolved the following significant Permit Enforcement matters in 2015:

- The California Department of Fish and Wildlife's (CDFW) completed construction of public access improvements at Ponds 9/10 achieving compliance with the newest public access requirement of BCDC Permit No. 2004.008.03, which authorized the restoration of the former Napa Salt Plant, located within the Napa-Sonoma Marshes Wildlife Area.
- The Neu Investment Corporation voluntarily resolved its public access maintenance violations of BCDC Permit No. M1988.060 at its Brink's Security Operation located on the Oakland shoreline in Alameda County and paid a standardized fine of $17,500, which was reduced from $35,000 at the discretion of the Commission's Chair.
- On November 24, 2015, Sinbad's Restaurant, the Port of San Francisco's tenant, finally vacated a building on the waterfront, which BCDC Permit No. 2012.001.05 required to be removed to establish a public access area as mitigation for the 34th America's Cup event.
- Staff negotiated a public access proposal with Fox/KTVU to enable this permittee to file as complete its application for retroactive approval to retain three satellite dishes constructed without BCDC approval in a dedicated public access area in Oakland, Alameda County (BCDC Permit No. 1978.036.03)
- Staff notified the Spinnaker Restaurant in Sausalito, Marin County, of two public access maintenance violations. Spinnaker Restaurant promptly resolved the first issue and paid a standardized fine of $100. Resolution of the second issue is pending.
- Staff notified the il Piccolo CAFFE' coffee house in Sausalito, Marin County, of an unpermitted fill and public access violation involving the placement of outdoor dining tables and chairs in a required public access area (BCDC Permit No. M1979.088.02). Staff's letter commenced an administrative penalty clock and, in response, the owner promptly resolved the issue within 35 days, thereby avoiding the accrual of any standardized fines.

Coordination, Collaboration, and Partnerships

BCDC continued and expanded its various relationships with other organizations to leverage its capabilities and integrate its programs with complementary efforts. Among the most important of these efforts were the following:

- BCDC serves as a voting member of the regional Bay Area Regional Collaborative (formerly known as the Joint Policy Committee), which coordinates efforts of the four Bay Area regional agencies with responsibility for air quality, transportation and land use planning and Bay management, and is focusing on adaptation to climate change. BCDC is working voluntarily with the other agencies to update the region's first Sustainable Communities Strategy (SCS), *Plan Bay Area* pursuant to SB 375, by preparing more detailed information on the Bay Area's vulnerability to rising sea level for inclusion into the second SCS.
- Recognizing that San Francisco Bay and the Sacramento-San Joaquin Delta form a single estuarine system that requires an integrated management approach, BCDC continued to coordinate planning for the Bay and the Delta by serving on the Delta Conservancy Board.
- BCDC coordinated with the Water Emergency Transit Authority to plan for numerous ferry facilities throughout the Bay Area.
- BCDC participated in quarterly "Abandoned Vessels" meetings hosted by the U.S. Coast Guard and also attended by the U.S. Army Corps of Engineers, State Lands Commission, Regional Water Quality Control Board, County Sheriff departments, local police departments, marine salvors and non-governmental organizations, such as the San Francisco Baykeeper.
- BCDC continued its partnership with the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, the San Francisco Regional Water Quality Control Board and stakeholders, on the Long Term Management Strategy for Placement of Dredged Material in the Bay Region (LTMS) and the Dredged Material Management Office (DMMO).
- BCDC partnered with the San Francisco Estuary Partnership, the San Francisco Estuary Institute, the San Francisco Bay Joint Venture and the Bay Area Flood Protection Agencies Association to examine ways to improve or realign flood protection channels to efficiently transport sediment into wetlands and to the Bay shoreline in concert with regulatory guidelines.

BCDC welcomes the challenges and opportunities ahead, and BCDC's Commissioners and staff are proud to fulfill BCDC's mission statement, embedded in its Strategic Plan, that reflects its two primary responsibilities: to protect and enhance San Francisco Bay and to encourage the Bay's responsible and productive use for this and future generations.

Sincerely,

R. ZACHARY WASSERMAN
Chair

SUMMARY OF PERMITS, FILL AND MITIGATION[1]

Year	Major Permits[1]		Minor Permits[2]		Permit amendments	Net change in Bay surface[3]	Total Project cost[4]	Public access	Public access
	granted	denied	granted	denied		(acres)	($000,000)	(acres)	(miles)
1970	12	1	66	0		- 72.0			
1971	26	4	61	0		- 25.1			
1972	12	3	80	0		- 7.0			
1973	17	1	71	0		- 4.4			
1974	20	0	107	1		+ 274.0			
1975	10	0	87	0		+ 5.0	100		
1976	14	0	110	0		- 2.2	43		
1977	20	0	116	0	104	+ 16.8	100	21.4	
1978	23	1	104	4	90	- 1.9	152	46.1	9.6
1979	34	0	120	2	103	+ 3.4	93	25.1	
1980	19	1	105	1	101	+ 30.0	470	134.0	
1981	23	0	134	0	125	+ 44.5	130	42.2	
1982	26	0	104	0	115	+ 262.0	379	27.0	5.0
1983	23	0	105	0	131	+ 5.0	395	26.0	6.0
1984	15	3	135	0	130	+ 12.0	97	12.0	7.0
1985	15	1	98	0	104	+ 60.0	200	35.0	6.3
1986	20	0	108	0	112	+ 11.0	639	35.0	5.1
1987	16	2	108	0	104	- 2.0	68	6.0	1.1
1988	17	1	119	2	137	+ 152.2	125	3.3	0.9
1989	17	0	114	1	144	+ 1.7	107	12.7	1.5
1990	17	1	112	0	151	- 1.5	127	12.7	2.0
1991	8	1	61	0	163	- 0.7	400	4.0	5.6
1992	10	1	84	0	140	- 1.6	97	10.4	1.9
1993	8	1	89	0	122	+ 50.1	26	0.2	0.3
1994	11	1	114	0	96	+ 1.6	383	264.0	6.9
1995	15	0	72	0	107	+ 549.6	136	2.8	0.9
1996	7	0	93	0	97	- 1.0	60	3.1	2.2
1997	14	2	109	0	94	+ 75.0	733	14.1	2.9
1998	15	1	109	0	130	+ 38.5	518	16.4	3.3
1999	10	0	103	0	124	+ 258.0	828	67.2	8.4
2000	21	0	85	0	141	+ 112.4	4,640	40.0	1.9
2001	14	0	67	0	67	+ 5,649.3	2,770	34.8	11.1
2002	6	0	75	0	103	+ 1.1	118	2.5	0.5
2003	11	0	59	0	79	+ 118.7	471	28.8	3.8
2004	7	0	74	0	95	+ 493.0	408	11.2	1.5
2005	8	0	57	0	93	+ 3,807.0	382	3.4	4.5
2006	1	0	35	0	114	+ 70.0	169	0.7	0.4
2007	8	0	52	0	71	+ 2,560.0	459	3.5	9.7
2008	5	0	39	0	73	+961.0	552	12.7	6.5
2009	4	0	40	0	74	+174.0	500	1.5	0.2
2010	8	0	65	0	95	+1,562.0	251	11.5	4.8
2011	3	0	20	0	121	+74	1,700	77.8	3.9
2012	5	0	38	0	74	+201	362	6.7	3.0
2013	6	0	38	0	105	+968	112	0.3	6.0
2014	6	0	48	0	135	+13.8	935	11	4.5
2015	7	0	42	0	121	-0.1	407	4	7.4
TOTAL	**614**	**26**	**3,832**	**11**	**4,285**	**18,496.2**	**$20,642**	**1,071.1**	**146.6**

[1] Projects authorized by major permits and major federal consistency concurrences. Some authorized projects have not been built, and some projects may have been changed pursuant to subsequent permit amendments.

[2] Smaller projects including consistency concurrences approved administratively or under regionwide permits.

[3] The area of the Bay created or restored, including salt ponds converted to tidal action, less the area of the Bay authorized to be filled pursuant to major permits and major consistency determinations through 1987. Thereafter, significant administrative permits and amendments are included in the data.

[4] Major and minor permits only.

SUMMARY OF ENFORCEMENT ACTIVITIES

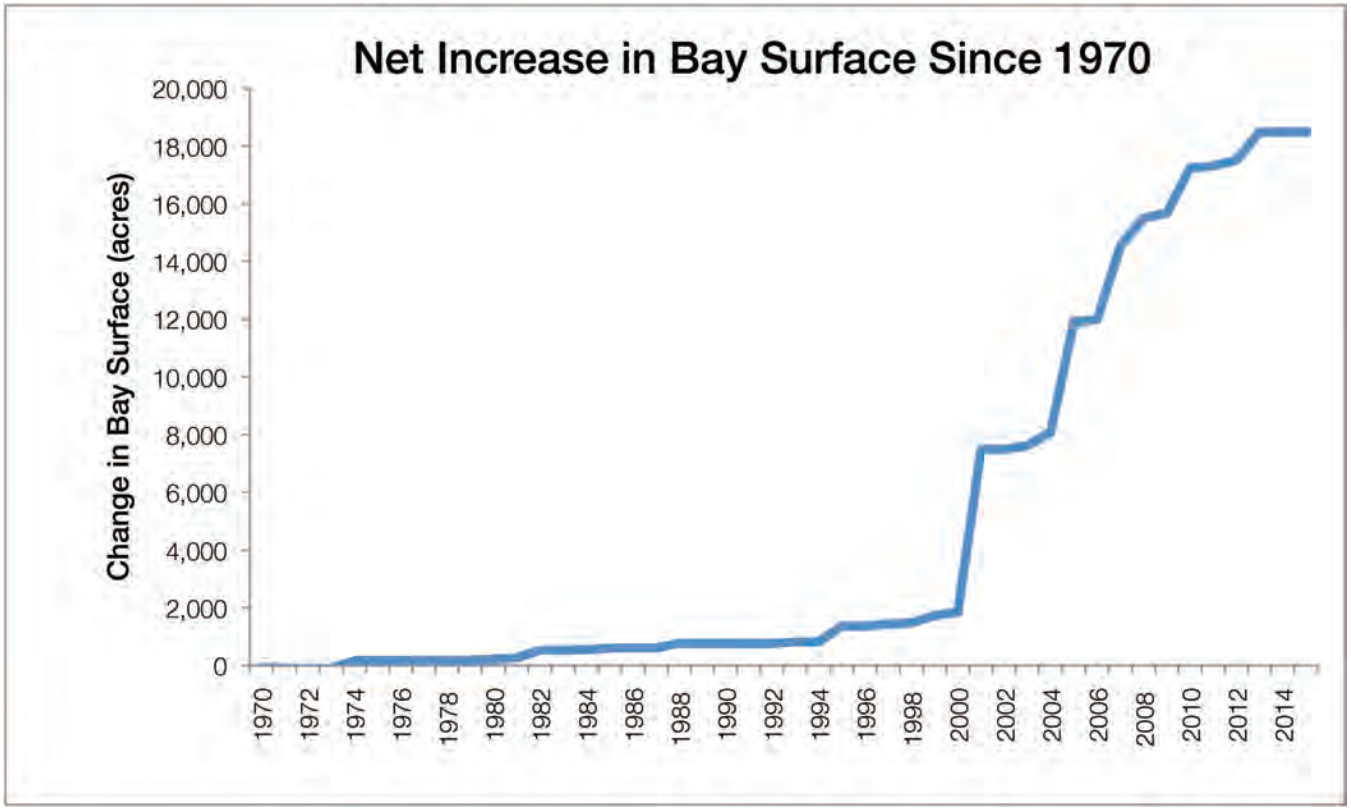
Caseload at the beginning of 2015:	151
New cases opened in 2015:	57
Cases closed in 2015:	13
Caseload at the end of 2015:	195
Cease and Desist Orders issued:	3
Enforcement related permits or amendments issued:	6
Civil penalties received:	$37,600

WORK PROGRAM AND BUDGET

WORK PROGRAM	FY 14-15[1]		FY 15-16[2]	
Core Program	PY	$000	PY	$000
Permits/Consistency Determinations	9.0	1,520	9.3	1,442
Enforcement	1.3	228	2.5	382
General Planning	4.2	549	2.9	458
Executive, Legal and Legislative Support	3.0	689	3.4	807
Administration, Commission and Clerical Support	11.0	1,322	8.7	1,181
Total, Core Program	**28.5**	**$4,308**	**26.8**	**$4,270**
Special Fund Projects				
Enforcement (Bay Fill Clean-up Fund)	1.2	156	0.2	19
Permits (Federal Coastal Act Grant)	1.5	149	1.5	123
Enforcement (Federal Coastal Act Grant)	0.5	50	0.5	41
Planning – 309 PSM Climate Policy (Federal Trust Fund)	0.7	82	1.3	107
California Climate Resilience Account	2.9	480		
NOAA Local Protection Program Ph. I (Federal Grant)	0.4	36		
NOAA Local Protection Program Ph. II (Federal Grant)	0.6	72	0.2	20
NOAA Local Protection Program Ph. III (Federal Grant)			0.9	75
NOAA Assessment & Strategy (Federal Grant)	0.3	25	1.2	95
Federal Coastal Impact Assistance Program	0.6	77	0.8	61
Regional Collaboration (Metropolitan Transportation Commission)	2.1	314	3.8	305
Solano County LPP			0.1	6
Oil Spill Prevention and Response Planning (Department of Fish and Wildlife)	0.7	159	2.0	161
Transportation Project Review (Caltrans)	1.5	149	1.7	137
Association of Bay Area Governments (ABAG)	0.2	45	0.4	35
Dep of Boating and Waterways CSM RSM			0.5	40
Bay Plan Amendments	0.2	36		
Total, Special Fund Projects	**13.4**	**1,830**	**15.1**	**1,225**
TOTAL PROGRAM	**41.9**	**$6,138**	**41.9**	**$5,495**
BUDGET				
Expenditures				
Personal Services		4,416		3,915
Operating Expenses and Equipment		1,722		1,581
Total Expenditures		**$6,138**		**$5,496**
Revenue				
General Fund		4,308		4,270
Bay Fill Clean-up and Abatement Fund		156		20
Federal Trust Fund		82		107
California Climate Resilience Account		480		
Reimbursements from Federal Grants		409		415
Reimbursements from Other Sources		703		684
Total Revenues		**$6,138**		**$5,496**

[1] Due to FI$Cal system transition, budget data for FY 2014–15 is estimated and has not been finalized.

[2] Due to FI$Cal system transition, budget data for FY 2015–16 is estimated and has not been finalized.


Net Increase in Bay Surface Since 1970
Change in Bay Surface (acres)
20,000
18,000
16,000
14,000
12,000
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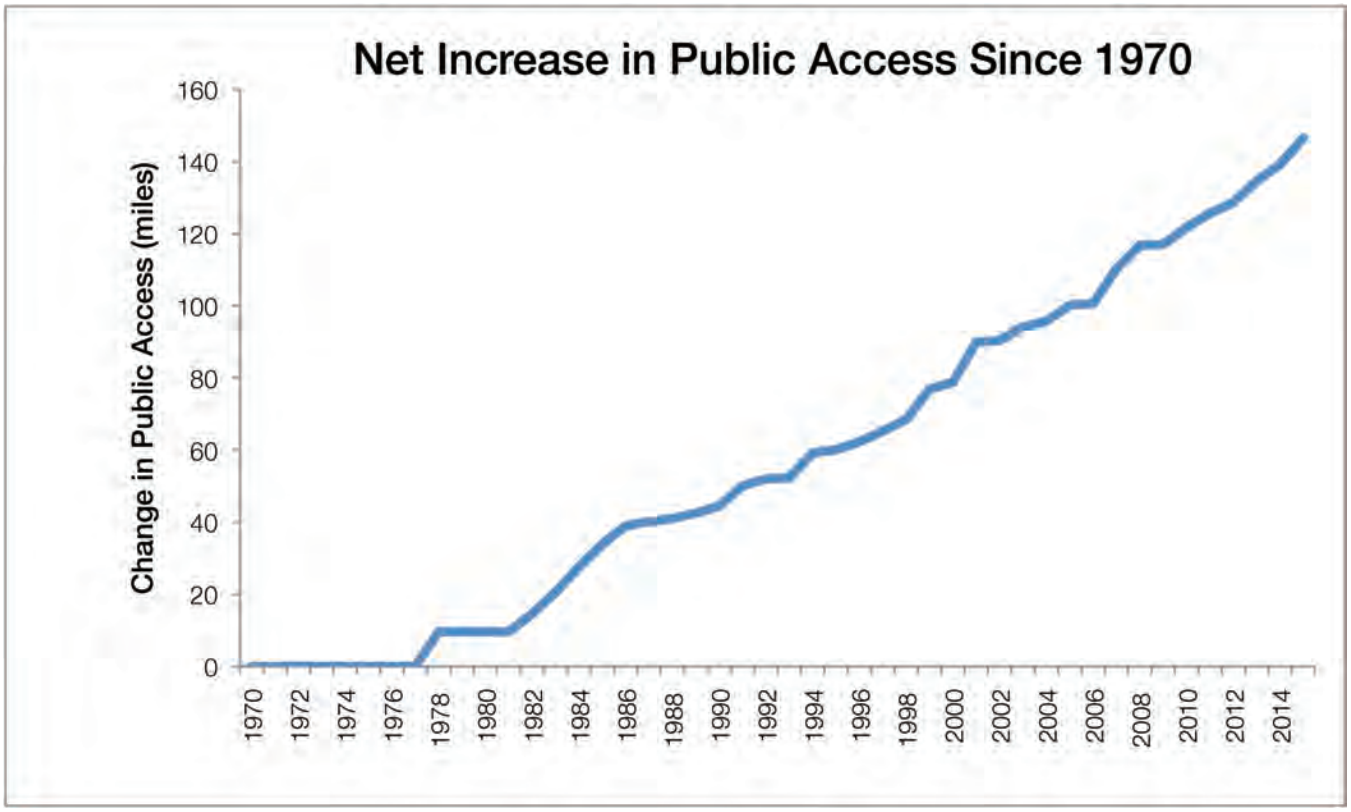
Net Increase in Public Access Since 1970
Change in Public Access (miles)
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140
120
100
80
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40
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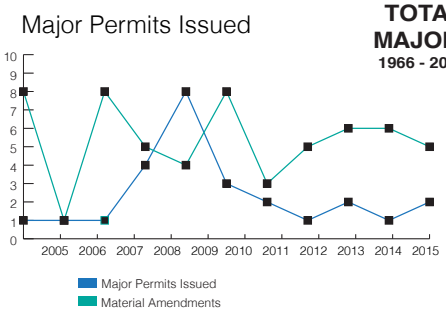
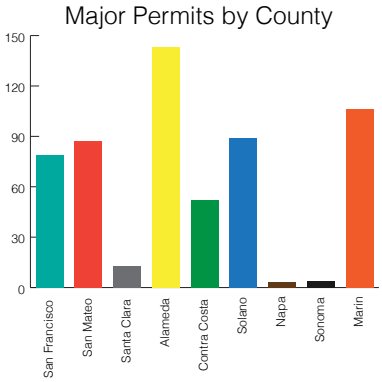
SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

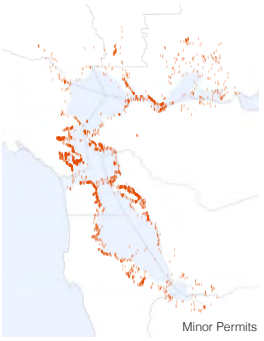
MAJORS

614 TOTAL MAJORS 1966 - 2015

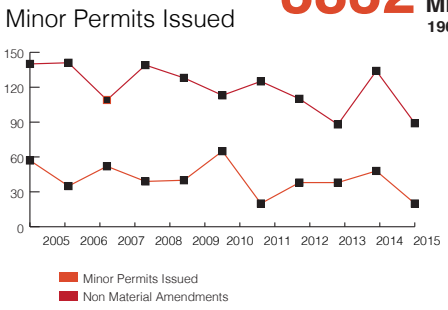


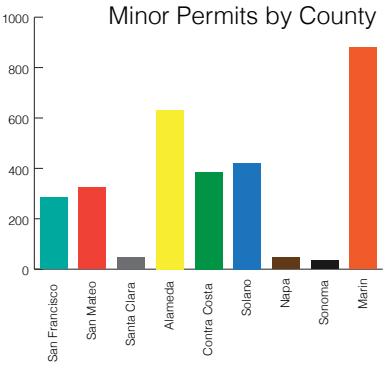


MINORS



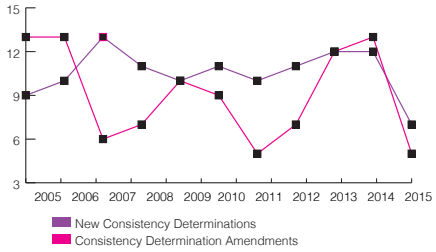
3832 TOTAL MINORS 1966 - 2015

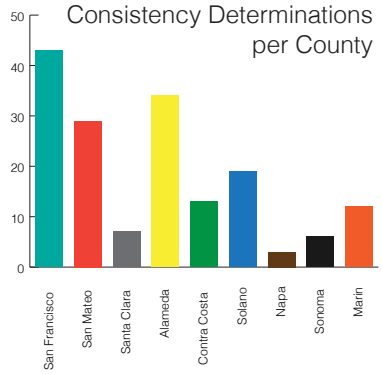




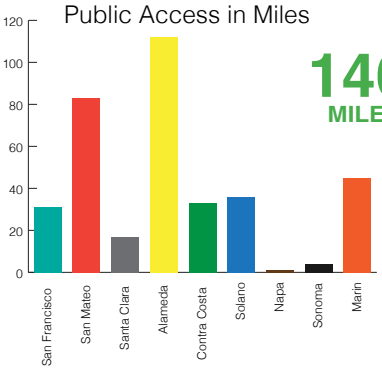
CONSISTENCY DETERMINATIONS

172 TOTAL CONSISTENCY DETERMINATIONS 1966 -2015

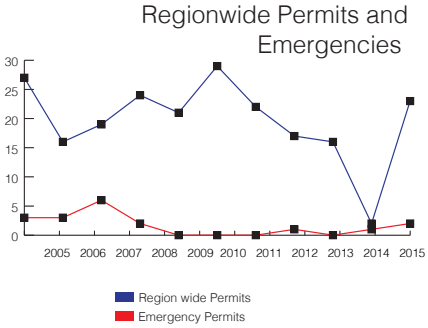




PUBLIC ACCESS



146 MILES TOTAL PUBLIC ACCESS 1966 - 2015



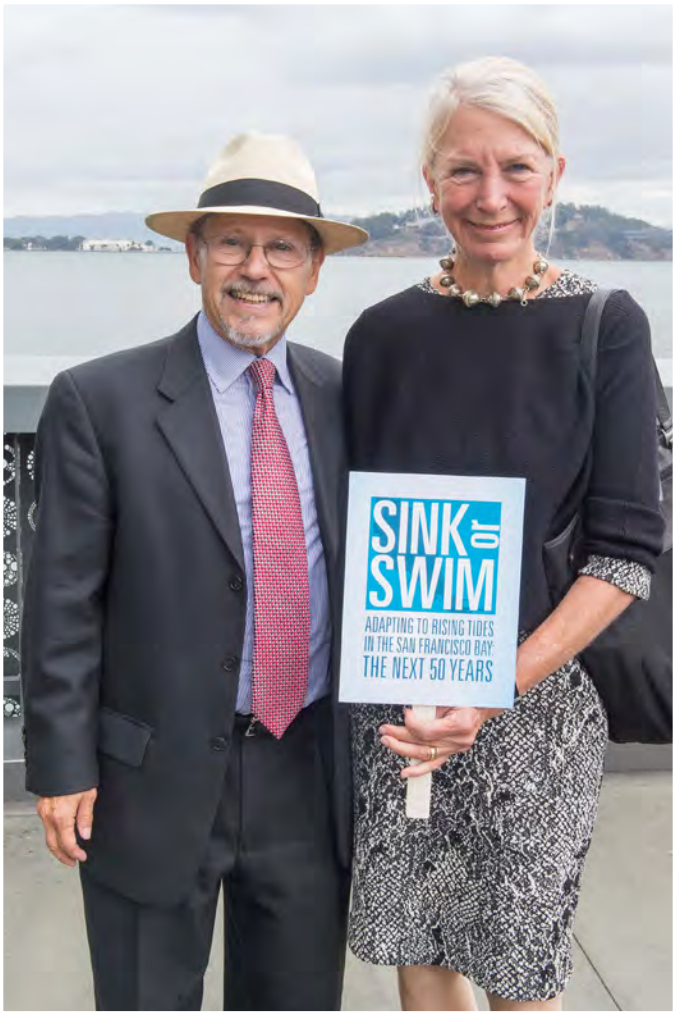
SINK or SWIM

ADAPTING TO RISING TIDES IN THE SAN FRANCISCO BAY: THE NEXT 50 YEARS

BCDC 50th Anniversary Summit

On September 16, 2015, the Friends of BCDC sponsored the Sink or Swim summit on rising sea level at the Exploratorium on Piers 15 & 17 in San Francisco. Architect William McDonough provided the keynote address, and several discussion panels were held to discuss how the region should prepare for a rising San Francisco Bay. Panel participants included John Laird (head of the California Natural Resources Agency), Zack Wasserman (Chair of BCDC), David Lewis (Executive Director of Save the Bay), Greg Dalton (Climate One, Commonwealth Club), Elizabeth Ranieri (Architect, Kuth Ranieri Architects) and Kate Lydon (Public Sector Portfolio Director, IDEO), Mike Ghielmetti (President, Signature Development Company) and Gabe Metcalf (Executive Director, SPUR).

The evening included a celebration of BCDC's 50 years of managing the Bay, where Assemblymember Philip Ting presented a commemorative proclamation from the state legislature.


SINK or SWIM
ADAPTING TO RISING TIDES IN THE SAN FRANCISCO BAY: THE NEXT 50 YEARS

San Francisco Bay Conservation and Development Commission

455 Golden Gate Avenue, Suite 10600, San Francisco, California 94102 tel 415 352 3600 **www.bcdc.ca.gov**

SAN FRANCISCO BUSINESS TIMES
ADVERTISING SUPPLEMENT
SEPTEMBER 18, 2015

San Francisco Bay Conservation and Development Commission

RISING TO THE CHALLENGE

In the coming years, the San Francisco Bay Area will see significant sea level rise. BCDC is helping communities prepare while preserving the quality of the Bay.

bcdc @50

The San Francisco Bay Conservation and Development Commission is working with Bay Area communities to plan for sea level rise.

From left: Anne Halsted (Vice Chair), Zack Wasserman (Chair) and Larry Goldzband (Executive Director).

OUR BAY ON THE BRINK

THE HIDDEN THREAT
TO OUR ECONOMY

The Bay is the heart of our region, economy, and our way of life. But outdated infrastructure and neglected bay wetlands leave Bay Area communities and businesses vulnerable to rising sea levels and extreme weather. Experts warn that if we don't act now, the Bay could be subject to at least **$10 billion dollars in widespread economic damage** from a flood event.

There are simple, low-cost solutions that scientists and engineers confirm will protect our economy from catastrophe.

We can:

> Upgrade outdated infrastructure, like levees.

> Restore wetlands, which serve as natural flood protection.

That's why businesses and environmentalists have come together to form Our Bay on the Brink, a new public information project.

BAYAREA COUNCIL — Leading in a connected world

Santa Clara Valley Water District

SAVE THE BAY

SILICON VALLEY LEADERSHIP GROUP

We all agree: if we want our children and grandchildren to inherit a thriving Bay Area, we must act now to protect it.

LEARN MORE: OurBayontheBrink.org @SFBayontheBrink

PHOTO COURTESY OF PORT OF OAKLAND

Oakland's Middle Harbor exemplifies innovative engineering that can lead to new policies.

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

Five decades of balancing preservation and growth

BCDC celebrates successes while rising to new challenges

Since 1965, the San Francisco Bay Conservation and Development Commission (BCDC) has been remarkably successful in its mission to protect and enhance San Francisco Bay and to encourage the Bay's responsible and productive use for this and future generations.

The Bay is now larger than it was when BCDC was established. Before 1965, an average of 2,300 acres were being filled each year. Now only a few acres are filled annually – all for critical water-oriented needs. In addition, opening previously diked areas has increased the size of the Bay.

More than 200 miles of Bay shoreline are now open to the public. When BCDC was established, only four miles of the Bay shoreline were open to public access. Today, the Bay and its shoreline are recognized as a national recreational treasure. Residents and visitors have ample opportunities to enjoy the Bay and its environs, including the Golden Gate National Recreational Area and numerous parks, beaches and the prize-winning Bay Trail. An array of restaurants, shops and residences grace the Bay shoreline, taking full advantage of their scenic locations.

The Bay Area economy has experienced unprecedented growth. BCDC has contributed to this growth by approving billions of dollars of construction and creating special area plans to encourage appropriate new development around the Bay.

San Francisco Bay continues to be a global shipping center. BCDC has provided strong support for maritime development while guiding regional port expansion and minimizing or avoiding impacts to the Bay's natural resources.

Bay wetlands have been protected and restored. Healthy wetlands are critically important "sponges" that provide habitat and a natural buffer against storms and sea level rise along the Bay shoreline. BCDC has prevented the filling of wetlands and mudflats, encouraged restoration of degraded marshes, supported the continued and productive use of salt ponds and helped to preserve the 85,000-acre Suisun Marsh. BCDC was also instrumental in establishing the San Francisco Bay and San Pablo Bay National Wildlife Refuges.

Bay Area jurisdictions are collaborating to address Bay issues. Local governments acting alone cannot fully address regional issues such as the challenges posed by rising seas. BCDC is raising awareness and building consensus among the many public agencies that touch the Bay and working to focus state and federal laws and policies on this regional resource of national significance.

The Bay Area has come together to Adapt to Rising Tides (ART). BCDC is leading a collaborative planning effort to help San Francisco Bay Area communities prepare for sea level rise and storm events while protecting critical ecosystems and community services.

"San Francisco Bay is a national treasure because of the stewardship of BCDC for the last 50 years."

San Francisco Mayor Ed Lee

"BCDC brings together local, regional, state, federal, nonprofit and private organizations... We need cooperation and foresight like this across California to adapt to the new normal of climate change."

California Natural Resources Secretary John Laird

Commitment to legacy of a healthy Bay

BY JOE BODOVITZ
BCDC's first Executive Director, 1965-1973

BCDC's success owes much to strong public support, but also to seven remarkable people – three women and four men.

When Kay Kerr, Sylvia McLaughlin and Esther Gulick, all with strong ties to U.C. Berkeley, learned that the City of Berkeley planned to fill the Bay out to the end of the Berkeley pier, they wondered how many other cities were planning to do the same. What would the Bay be like if they succeeded?

The women did not just wonder. They organized. They formed the Save San Francisco Bay Association and asked their Assemblyman, Nick Petris, to sponsor fill-control legislation in Sacramento. But the initial efforts didn't succeed.

Next they turned to Senator Eugene McAteer of San Francisco. McAteer's legislative skills and tenacity, helped by Petris, led to passage of the McAteer-Petris Act in 1965, which created BCDC – if only temporarily.

Mel Scott, a researcher at U.C. Berkeley (who coined the name Bay Conservation and Development Commission), wrote the first analysis of Bay issues. He explained how easy the Bay is to fill because it is so shallow in many places and riddled with complex and divided ownership of underwater property.

The temporary commission might well have floundered but for its chairman, Melvin B. Lane. Lane, whose family published *Sunset* magazine and a series of books about California's great natural settings, was both a businessman and an environmentalist. His quiet leadership was exactly right for the job.

The Commission completed its work on time and, in 1969, the legislature voted to make BCDC permanent. Imagine what the Bay might look like today had BCDC not been here to minimize fill and maximize feasible public access!

Citizen action has brought public benefits

BY MIKE WILMAR
BCDC Executive Director, 1979-1983

Viewed from the perspective of 50 years, BCDC's achievements are truly remarkable. Created in 1965 to respond to the haphazard, uncontrolled filling of San Francisco Bay, and with only a four-year life span, BCDC had what seemed to be the insurmountable task of creating a plan for San Francisco Bay. The legislature gave BCDC the permit power to override local government Bay fill decisions in the meantime, a truly revolutionary step.

But the San Francisco Bay Plan was completed on time. The planning process was hailed as a model of citizen involvement. And in 1969, after an epic battle that pitted an energized citizenry against entrenched special interests, the legislature made BCDC permanent and gave it the power to carry out the Bay Plan through the issuance of permits. BCDC's permit jurisdiction was also expanded to the shoreline, where every project would now have to provide maximum feasible public access.

The results speak for themselves. Since 1970, as a result of mitigation and public access conditions in BCDC permits, the Bay has increased in size by almost 29 square miles. The amount of new shoreline public access is equally impressive: almost 200 linear miles. Along the way, BCDC has authorized projects with a total project cost of almost $20 billion.

Even these achievements fail to fully capture BCDC's larger legacy. BCDC has played a pivotal role in shoreline planning and habitat protection. BCDC's success led directly to the California Coastal Commission, the Tahoe Regional Planning Agency and the federal Coastal Zone Management Act of 1972. The expansion of federal and state jurisdiction over navigable waters and wetlands in California and elsewhere is also traceable to the BCDC effort. Similarly, the state's heightened scrutiny over the last 50 years of the use and protection of California's tidelands stems directly from BCDC's early focus on the public interest in these areas.

In keeping with its pioneering spirit, BCDC has now turned its attention to a challenge wholly unforeseen 50 years ago: an expanding Bay as the result of climate change and rising sea levels.

BCDC rises to meet new challenges

BY WILL TRAVIS
BCDC Executive Director, 1995-2012

It might seem unrealistic to expect BCDC, which was created to address uncontrolled Bay filling in the past, to successfully grapple with rising sea level in the future. But BCDC possesses an unusual legal authority that will help it meet this challenge.

BCDC evaluates permit applications to determine whether proposed projects will be consistent with both the general provisions of state law and the more specific policies of the San Francisco Bay Plan. The Commission is legally authorized to amend the Bay Plan to reflect new information and conditions. Thus, BCDC can amend its regulatory standards to allow development that will be resilient to rising sea level, as well as protect the natural resources of San Francisco Bay.

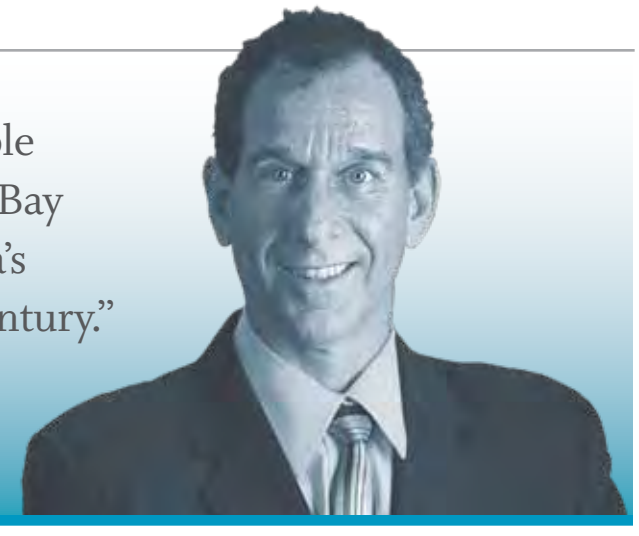
Using this authority and flexibility wisely presents a formidable challenge. Virtually all government coastal laws treat the location of the shoreline as a fixed location, but as the sea level rises upward, the shoreline will move inland — or at least it will unless shoreline barriers are built ever higher.

To deal with this challenge, society will have to find new ways to make productive use of shoreline areas in a manner that will accommodate and adapt to the fact that the shoreline wants to forever migrate inland. BCDC and other agencies can then reverse engineer their policies to make it possible to permit the resilient structures.

To advance this process, BCDC should encourage ideas for innovative adaptation by recognizing that failure is an inherent part of the process of innovation. BCDC should be willing to authorize innovative projects even though they may not work. BCDC can learn from these failures and move on to then craft thoughtful long-term policies that accommodate resilient shoreline development.

"Only a coordinated, comprehensive approach will enable us to meet the challenges posed by rising San Francisco Bay waters. BCDC's leadership role is crucial to the Bay Area's environment, economy and infrastructure in the 21st century."

State Senator Bob Wieckowski
Chair, California Senate Environmental Committee



Projected inundation of a portion of the South Bay in the year 2100, using mid-range estimates.

How will we adapt?

Sea level rise is a given; how we plan for it will mean the difference between disaster and resilience

San Francisco Bay is rising and it's time to prepare for how we're going to adapt.

The fact is, rising sea level, from as little as six inches in 2030 to 36 inches in 2100, and possibly much higher, are going to affect everyone in the Bay Area, whether they live next to the Bay, do business there or commute just about anywhere in the region. Records from the Bay's tidal gauge show that it has risen about eight inches since 1900.

And the challenges posed by rising sea level will be compounded by tides and storms.

"Anyone who wants to get to SFO or the Oakland airport or ship goods through the Port of Oakland or who rides BART or Muni will be affected," says Zack Wasserman, BCDC's chair.

"Those who travel on highways or depend on East Bay MUD for wastewater treatment or the Delta for clean drinking water are going to feel the effects, as are Silicon Valley companies like Google and Facebook that abut the Bay."

While Bay Area governments and the state have long been working to reduce greenhouse gas emissions, mitigation alone will not be adequate to address impending sea level rise and other climate change impacts.

In 2010, BCDC partnered with the National Oceanic and Atmospheric Administration (NOAA) to work with Bay Area communities to plan for sea level rise.

"For years, those concerned with global warming and climate change focused on mitigation – lowering emissions of greenhouse gasses," says Larry Goldzband, BCDC's executive director.

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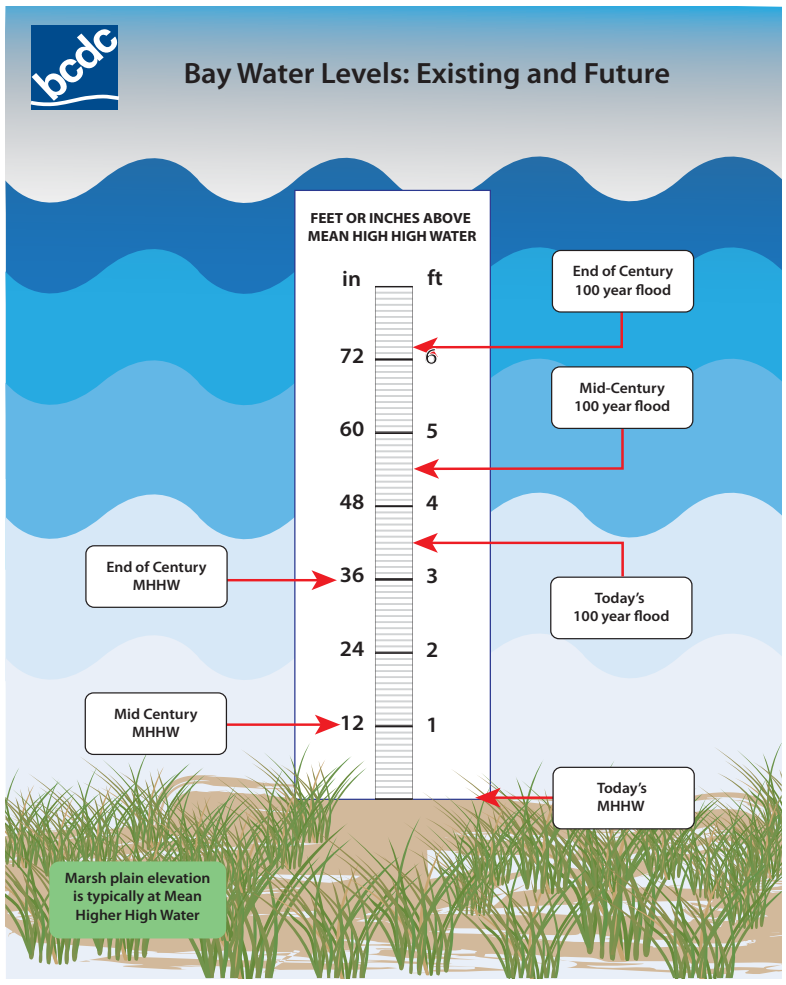

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"While these measures are critically important, we also need to be prepared to adapt to the effects of climate change, including a significant increase in sea level."

The pioneering Adapting to Rising Tides (ART) program is studying local vulnerabilities in depth, creating adaptation strategies to build resilience and modeling a planning process that can be replicated throughout the Bay Area – all with the active participation of local residents, non-governmental organizations and other government affiliates.

Motivating positive action

"One of the reasons ART is successful is the way we're working collaboratively with local jurisdictions, community activists, nonprofits and other agencies so that everyone can understand their neighborhood's vulnerabilities, as well as the region's, and what they can do to plan for them," says Goldzband.

"We're not about scaring people into paralysis, but in educating and motivating them to take action."

No time to waste

There's no time to waste. Experts agree that today's flood is the future's high tide. Areas that currently flood every 10 to 20 years during extreme weather and high tides will begin to flood regularly.

In addition, flooding will be more frequent and longer-lasting. There's a danger of toxins being released from contaminated areas or industrial sites and sea levels undermining seismic stability due to liquefaction.

The Bay Area is the fifth-largest metropolitan area in the country, surrounding the nation's most urbanized estuary. At risk are thousands of homes, critical infrastructure, Silicon Valley, Mission Bay, diverse habitats and valuable community resources.

"We need to instill a sense of urgency in identifying and advancing groundbreaking solutions," says Wasserman. "Planning now for the next 20-50 years is essential."

In San Jose, that planning includes "a focus on 'not making the problem worse,'" says Mayor Sam Liccardo. "The most important action cities can take today is saying 'no' to development in low-lying areas that's surely to be imperiled as we see rising sea levels."

San Jose is also investing in supporting and replacing levees around sensitive assets and is engaged in regional conversations around large investments needed to protect critical assets, like airports and highways, as well as the homes and businesses that could be impacted by inundation.

One of the significant benefits of BCDC's ART program, says Daniel Hamilton, sustainability program manager in the City of Oakland, is the way it has influenced city planning.

"As a result, we're developing new regulations for how we deal with private lands, public lands and critical infrastructure," says Hamilton.

ALAMEDA COUNTY ADAPTING TO RISING TIDES PROJECT

Project Scope

The first project undertaken by the Adapting to Rising Tides (ART) program was working with communities to assess the vulnerability to sea level rise and storm surges in a 66 square mile area of Alameda County and to develop strategies that could reduce and manage the risks they face.

The project area stretches from Emeryville to Union City and includes six cities, one unincorporated community and numerous special districts. The study area includes shoreline residential communities, the Oakland International Airport, energy infrastructure and pipelines, the Port of Oakland, wastewater treatment plants and parks, protected habitats and recreation areas.

Possible Adaptation strategies

ART developed a number of possible adaptation responses that can be applied at multiple scales: from an individual asset to an entire project area. Any adaptation option needs to address a wide variety of information and governance challenges, physical conditions and, above all, fit well into the place that adopts those particular strategies.

Enjoying a morning stroll along the Bay Trail.

For example, the connection to the Bay Bridge toll plaza from I-80/Powell St. is highly susceptible to flooding. Possible solutions could include improving the drainage system, raising the roadway or constructing a causeway over low-lying areas, building a berm or floodwall along the perimeter of the freeway and retrofitting the toll plaza to elevate wiring and electrical elements.

"Each possible solution comes with its own set of challenges but none is insurmountable," says Goldzband.

Planning process

Rising water has no respect for jurisdictional boundaries; the flow will follow the path of least resistance. One of the most valuable outcomes of the ART planning process has been fostering collaboration among public agencies, nonprofits, private interests and community activists to increase the Bay Area's preparedness and resilience to sea level rise and storm events while protecting critical ecosystem and community services.

BCDC and its partners are moving forward with resilience planning efforts that address specific sectors, neighborhood assets and supportable broader resilience planning that is underway in the region.

OAKLAND/ALAMEDA SHORELINE RESILIENCE PLANNING

Project scope

The Oakland/Alameda shoreline has significant infrastructure and community assets that are at risk due to its location, low-lying topography, underlying Bay fill and other loose soils that are susceptible to liquefaction. Many of the assets in the focus area have regional significance. Consider, for example, the disruption to the regional and state economies if flooding cut off access to Oakland International Airport.

Planning process

BCDC and the Association of Bay Area Governments (ABAG) are working with stakeholders to plan for multiple hazards in a holistic way – earthquakes, sea level rise and flooding.

By looking at an array of vulnerabilities and opportunities for solutions, project managers hope to streamline the planning process for all of the many jurisdictions and property owners involved.

Priority areas for adaptation strategies include those where flooding is most likely:

- Access on and off Alameda's Bay Farm Island and to and from the Oakland airport.
- Housing and community facilities in low-lying areas.
- The Oakland Coliseum neighborhood, facilities, and transportation assets.
- Shoreline habitat, much of which is not predicted to persist given sea level rise, sediment projections and surrounding land uses.

Just as important, the project is examining how assets within the focus area are related to each other and how they relate to those outside the focus area.

"We're changing our systems and decision-making criteria for everything from planning to how we prioritize capital investments."

Earlier this year, San Francisco Mayor Ed Lee convened an interagency Sea Level Rise Coordinating Committee to coordinate city efforts to deal with and plan for the potential impacts of higher waters.

"The realities of climate change and sea level rise threaten not just the beauty of our fragile coastline but the future of our neighborhoods, public infrastructure and way of life," says John Rahaim, San Francisco's planning director. "I look forward to working together with BCDC toward developing innovative solutions so that San Francisco will not just survive, but flourish in the face of these challenges."

"The Adapting to Rising Tides program is an inspiration to those of us in county government for how to think about and plan for the impact of rising seas in our communities… BCDC is leading the way."

Supervisor Kathrin Sears,
Marin County District 3

Not just a shoreline problem

San Francisco Bay is a dynamic tidal estuary connected to the Pacific Ocean through the Golden Gate. As sea levels rise so will the Bay, which will affect everybody, whether you live next to the Bay, in Cupertino or in Livermore.

"All of us rely on infrastructure that is next to the Bay that will be affected by rising sea level, including highways 101 and 880, BART and CalTrain, SFO and Oakland airports, our seaports, wastewater treatment plants and major business headquarters, just to name a few – so we all need to work together to figure out how to become resilient regionally and plan for the future," says Goldzband.

CONTRA COSTA COUNTY ADAPTING TO RISING TIDES PROJECT

Project scope

The Contra Costa ART project includes west and central Contra Costa County, from Richmond to Bay Point. The project encompasses a broad expanse of areas that are vulnerable to rising Bay water, including the Richmond Parkway, residential neighborhoods in the cities of Richmond and San Pablo, the enormous West County landfill, and the Chevron and Tesoro refineries.

Planning process

Using the ART approach, stakeholders are working together to investigate how flooding may impact transportation and utility networks, industrial facilities and employment sites, residential neighborhoods, community facilities and shoreline park and recreation facilities.

Some areas along the shoreline or streets or rivers already experience temporary flooding during Pacific storms when high tides coincide with high winds or when significant rain causes creeks and rivers to overflow their banks. While some assets and areas can function after the water recedes, others may suffer irreparable damage.

"The problems are complicated by the fact that the region's urbanized areas are served by an infrastructure network that depends on gravity to drain," says Wendy Goodfriend, senior planner, BCDC. As Bay waters rise, the ability of these systems to move water effectively and efficiently away from residential and commercial areas will be significantly impaired.

Prolonged inundation can release pollutants from contaminated landfills and toxic materials from storage tanks, pipelines or industrial sites and increased sedimentation in tidal creeks. Shoreline erosion can damage roads, bridges and footings, levees, embankments and foundations.

Flooding can also result in disruptions of power, water and water treatment, and access to goods, services and jobs, and impair disaster and recovery response. Power outages can damage underground electrical and mechanical equipment and homes that rely on electric pumps.

With the loss of communications services and utilities, the movement of goods and commuter services, job sites, government services and businesses will be disrupted – and the losses to the economy will be significant.

Adaptation strategies

ART is helping conduct a high-level assessment for the entire project area. Adaptation responses – from further information gathering and infrastructure changes to resource management and policy solutions – will be developed to address the highest-priority needs.

HAYWARD SHORELINE RESILIENCE STUDY

Project scope

The Hayward Regional Shoreline covers 817 acres between Hwy. 92 and San Lorenzo Creek. It is a good example of how planners need to take multiple uses and multiple constituents into account when figuring out adaptation strategies.

The project is taking a close look at two miles of shoreline that includes sloughs, marshes, mud flats, a rocky shoreline and former landfills; major wastewater infrastructure; a large power plant; and the western approach to the Hayward-San Mateo Bridge. The Bay Trail runs along the top of dirt levees built in 1854.

From the Hayward Shoreline Interpretive Center, visitors can see how the marshes are transformed into mudflats at low tide, bustling with sea birds probing in the mud for food. At high tide, the marshes are flooded and the birds take to floating on the lapping waves, wading the shallows or diving for a meal.

"The Hayward shoreline is a great place for seeing how the tides affect the Bay and inland marshes and also threaten bayshore development," says Lindy Lowe, senior planner, BCDC.

Possible adaptation strategies

Options being discussed by the community include:

- Addressing the impact of extreme tidal flooding on marshes and managed ponds and improving bayfront levees.
- Replacing or substantially upgrading the joint wastewater outfall pipeline, which serves some 900,000 residents.
- Improving the resiliency of the approach to the Hayward-San Mateo bridge, from installing new drainage systems to eliminating or relocating the toll plaza, building levees or seawalls, or constructing an elevated causeway.
- Retrofitting and possibly relocating the Hayward Shoreline Interpretive Center.
- Constructing a horizontal levee near the shoreline through the oxidation ponds to protect commercial/industrial land and maintain utilities in their current location. The Bay Trail could be sited on top of the levee.
- Adopting new decision-making frameworks to plan, permit and fund new adaptation projects.

Next steps

The study is a significant step for adaptation along the Hayward shoreline. Now it's up to working group members and local asset managers to carry the information forward in their own agencies to better prepare for temporary flooding and permanent inundation.

Port of Oakland preparing for sea level change

The Port of Oakland is a world-class international cargo transportation and distribution hub. Oakland was among the first ports globally to specialize in the intermodal container operations that have revolutionized international trade.

The Port of Oakland loads and discharges more than 99 percent of the containerized goods moving through Northern California, the nation's fifth largest metropolitan area. Oakland's cargo volume makes it the fifth busiest container port in the United States.

Of California's three major container ports – Oakland, Long Beach and Los Angeles – Oakland is almost 300 nautical miles closer to Asia, a major trading partner of the U.S. This means reduced transit times, lower fuel and vessel costs and faster turnaround for ocean carriers.

PHOTO COURTESY OF PORT OF OAKLAND

The Port of Oakland is taking a proactive approach to adapting to sea level change.

PORT OF OAKLAND BY THE NUMBERS

73,000
Jobs in the Bay Area

50%
Of the nation's total cargo volume

2
Major railroads serve the port

300 miles
Closer to Asia than Long Beach or Los Angeles

The Port of Oakland supports more than 73,000 jobs in the region and is connected to nearly 827,000 jobs across the nation.

The Port of Oakland also owns and operates the 2,500-acre Oakland International Airport. Both the seaport and airport are low-lying and vulnerable to the impacts of sea level rise.

"Different parts of the Bay are vulnerable in different ways," says Richard Sinkoff, the Port's director of environmental programs and planning. "Working with BCDC, we're beginning to understand that we don't need to buttress the entire Bay to protect the built environment. If we address the most vulnerable points along the shoreline, we can potentially have a greater beneficial effect on upland areas."

The Port is taking a three-pronged approach to adapting to sea level rise: planning, policy development and engineering design.

"BCDC has been successful in implementing policies to prevent the filling of the Bay," says Sinkoff. "With projected sea level rise, certain areas may actually benefit from creating living shorelines that can temper the effects of storm surge and rising sea level."

The Port, other agencies, jurisdictions and the private sector can be a source of innovative engineering solutions to adapting to sea level rise, says Sinkoff.

He cites the Port's creation of a 180-acre shallow water tidal habitat at the foot of Seventh Street is an example of how prototypical projects can guide new policies to temper the effects of sea level rise and storm surges.

The Middle Harbor habitat was built using clean material from harbor deepening projects and now provides both a rich ecological area for birds and fisheries and natural shoreline protection.

"The potential is enormous for what BCDC is doing to influence our future planning for low-lying areas," says Sinkoff. "As a region, we're looking at private land use, public land use, infrastructure, development regulations and how we prioritize capital investment."

Stronger Housing, Safer Communities

Most Bay Area homes are not built to withstand any amount of flooding. Historic and current construction materials, siting and design standards do not address potential exposure to either water or salt. As sea level rises, housing of all types within flood hazard areas will be at greater risk of flooding, and neighborhoods close to the bayshore – from low-lying neighborhoods around the Oakland Coliseum and in West Oakland to Marina Bay in Richmond, East Palo Alto, Redwood Shores and Corte Madera – will be at even greater risk.

A quarter of the land in East Palo Alto is within the current 100-year flood plain.

The Association of Bay Area Governments (ABAG) and BCDC partnered to identify what makes Bay Area housing and communities more vulnerable to earthquakes and flooding related to sea level rise and to develop strategies that reduce these vulnerabilities.

"As communities gain experience with assessing vulnerability to sea level rise and flooding and begin putting recommendations into action, they'll further modify the recommendations or develop additional adaptation strategies of their own," says BCDC's Lindy Lowe.

BUILDING RECOMMENDATIONS

Adopting safe, smart growth strategies

- Establishing a cooperative, coordinated shoreline management program to facilitate shared decision-making and funding to reduce risks.
- Developing guidelines for transit-oriented development to reduce flood risks.
- Encouraging innovative insurance solutions, including the expansion of mandated catastrophe insurance programs.
- Advocating improvements in multi-family rebuilding efforts.
- Decreasing reliance on grid-supplied power.
- Promoting innovative resilient design solutions.

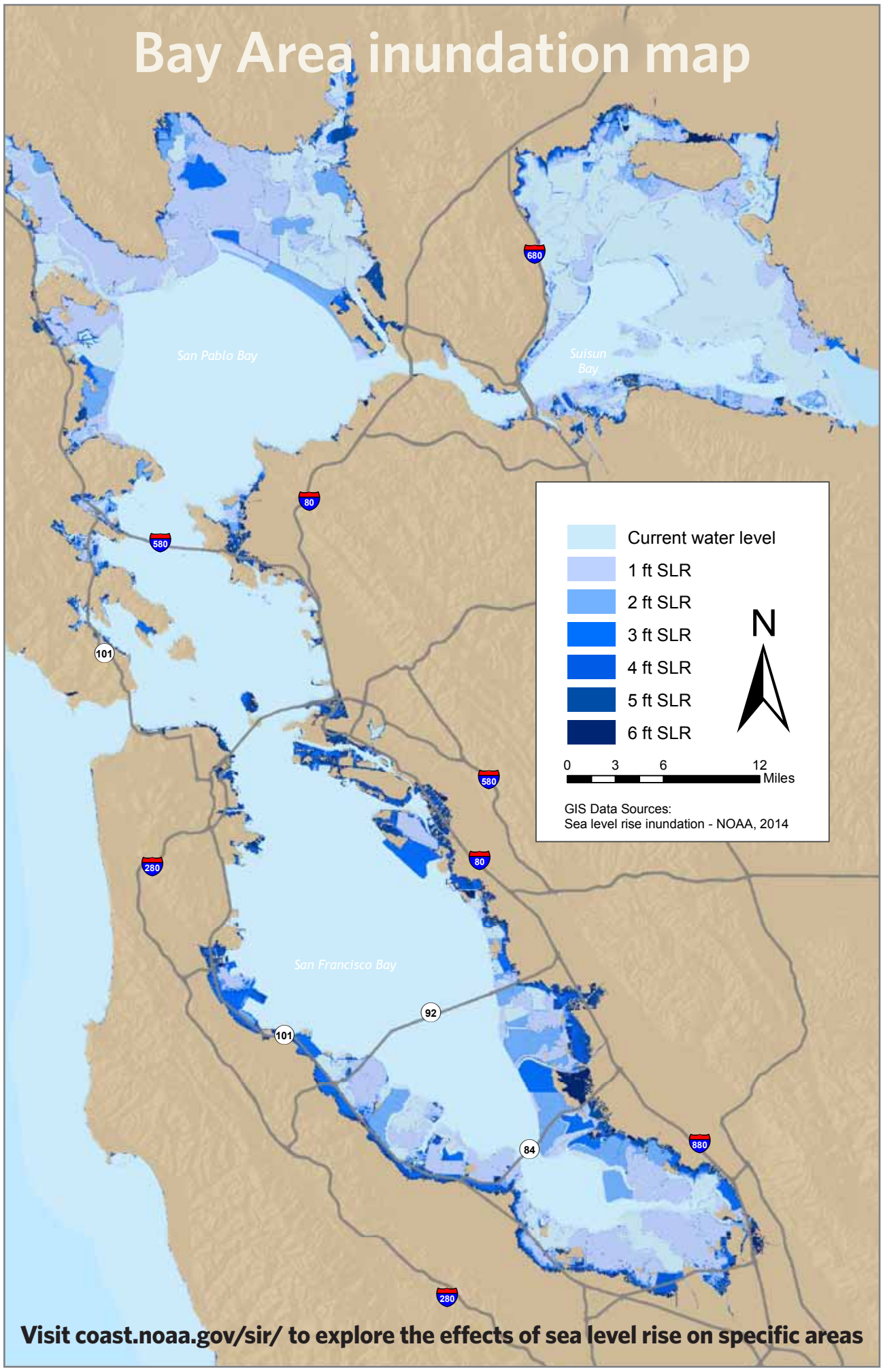
Protecting critical facilities in high hazard areas

- Prohibiting development of critical infrastructure and public service facilities in the most hazardous areas, and offering incentives for relocation.
- Redirecting development to low hazard areas.
- Placing permanent conservation or hazard mitigation easements on properties in high-hazard areas.

Addressing flooding hazards

- Encouraging local governments to implement floodplain management activities through integrated watershed management, improved runoff storage, green infrastructure and floodplain restoration.
- Requiring flood-proof construction within or near flood hazard zones.

Bay Area inundation map



Visit coast.noaa.gov/sir/ to explore the effects of sea level rise on specific areas

"BCDC provides the technical knowledge and expertise we cannot replicate at the local level."

Supervisor Dave Pine,
San Mateo County, District 1

SEA LEVEL RISE BY THE NUMBERS

8 inches
Sea level rise since 1900

6 inches
Sea level rise by 2030

36 inches
Sea level rise by 2100

355,000
Residents in Bay Area's 100-year floodplain*

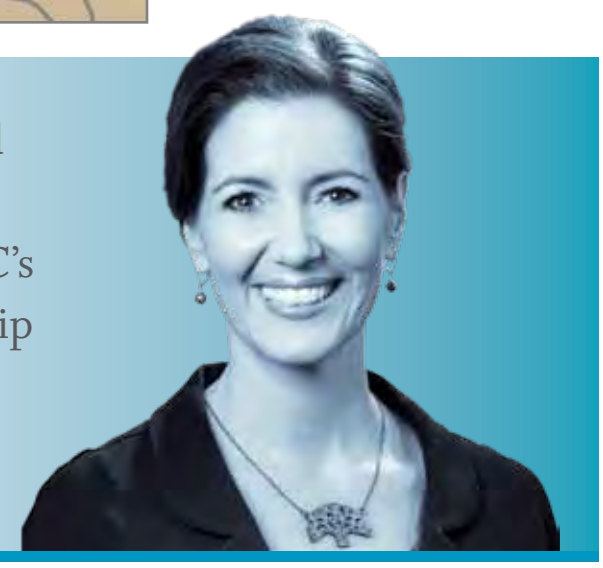
$46.2 billion
Value of structures & contents in Bay Area's 100-year floodplain*

$10.4 billion
Potential economic loss from superstorm & associated floods*

* FROM BAY AREA ECONOMIC INSTITUTE'S SURVIVING THE STORM STUDY

"We are fortunate to live in one of the most beautiful and geographically rich and diverse parts of the country, but with that diversity comes risk and responsibility… BCDC's work illustrates the power and effectiveness of partnership in the face of big challenges."

Oakland Mayor Libby Schaaf



Business is taking up the challenge

A recent Bay Area Council Economic Institute study found a superstorm and associated flooding could have a $10.4 billion impact on the Bay Area economy

COURTESY OF SF GIANTS

Waterfront Development: The Giants' proposed Mission Rock development (top) and the Treasure Island plan. Both have incorporated innovative engineering stragies to create resilient shorelines.

While a coordinated public sector response is necessary to tackle the impacts of sea level rise, the best practices are going to come from a collaboration of the public and private sectors.

"There's growing awareness within the business community about the economic and environmental imperative for protecting the Bay," says Jim Wunderman, president and CEO of the Bay Area Council.

"We see it manifested in numerous projects along the waterfront. There's more work that needs to be done, particularly in figuring out how we will finance both ecological enhancements and man-made structures. This will require close collaboration among agencies like BCDC and groups like ours that represent many of the region's largest employers."

Resilient shoreline at Mission Rock

The San Francisco Giants propose building 1,500 rental units, a new Anchor Brewery and space for local retailers on a windswept 24-acre parking lot just south of AT&T Park. The project goes before voters this coming November.

Project managers have incorporated innovative engineering strategies to create a newly resilient shoreline at the site, with interior grades for buildings set above the 100-year flood levels and low-lying areas preserved and expanded as wetlands to accommodate flooding at the perimeters.

"The Giants have enjoyed a long partnership with the Port, BCDC and the State Lands Commission," says Larry Baer, Giants' president & CEO. "We've worked together for years to improve and maintain the waterfront around AT&T Park."

"BCDC has partnered with the Dutch government, the Port and other key public agencies on important studies for Mission Creek and the Mission Bay area."

Baer points out that more than eight acres of parks at Mission Rock will reconnect people to the waterfront, which will help to "encourage future generations to continue environmental stewardship of this incredible regional resource."

Adapting Google's campus

Google is making adapting to sea level rise an integral component of its proposed redesign of its Mountain View Campus. Plans include both ecological restoration and transferring development from lower lying areas along Stevens Creek to higher elevation areas near Hwy. 101 – an important regional precedent for adaptation to accelerated sea level rise.

Google's proposal offers a significant opportunity to address large-scale restoration of core habitats, specifically Permanente Creek and Charleston Retention Basin.

Protecting PG&E's customers

As a provider of energy to nearly 16 million Californians, "PG&E has extensive plans in place to help us face the challenges of a changing climate," says Pat Hogan, vice president of the utility's electric operations.

"We're focused on building a more modern, flexible and resilient system to ensure the delivery of safe, reliable, affordable and clean energy."

In addition to its own internal risk assessment process, PG&E is engaged with cities and counties throughout the region to learn more about the impacts of climate change, such as sea level rise and extreme storms.

A recent Bay Area Council Economic Institute study that found a superstorm and associated flooding could have a $10.4 billion impact on the Bay Area economy. PG&E estimates that disruption to its substations could result in losses to customers of up to $125 million.

The good news is that PG&E has a resilient electric grid with interconnected

substations that can play a back-up role and help minimize customer service interruptions. The utility also has a fleet of more than 20 mobile substations that can be dispatched to support impacted areas.

To further reduce the risk, PG&E has elevated three of its substations in San Mateo, Napa and Contra Costa counties.

Treasure Island plans for sea level rise

San Francisco is poised to have a new residential and commercial community built just offshore on the former naval base at Treasure Island. Plans include some 8,000 new homes, 450,000 square feet of commercial and retail space, 500 hotel rooms and a new ferry terminal and transit program. The project will include 300 acres of open space, three miles of shoreline trails and a 400-slip marina. Upgraded wastewater treatment and recycling facilities are also in the works.

Treasure Island's location in the Bay and low-lying terrain makes the proposed development a perfect example of the need to plan for sea level rise.

Using BCDC analysis and project-specific data prepared by Moffatt & Nichol, developer Wilson Meany's engineers have designed an "adaptive management strategy" that provides for flexibility in dealing with rising tides and surging Bay waters.

Plans call for improvements to the shoreline and storm drain system, and elevating the development footprint three feet above the 100-year high tide mark.

Development setbacks were included along the perimeter of the island so that future improvements can be constructed within the island footprint without encroaching on the Bay.

"We have to avoid foreclosing future adaptation strategies while we adapt along today's shoreline," says BCDC's Regulatory Director Brad McCrea. "We have to provide enough room for tomorrow's ideas."

Flood protection along Belmont Creek

In July, the San Carlos City Council approved a $1.7 million contract to dredge Belmont Creek and a channel along Holly Street near Hwy. 101; Redwood City will chip in $200,000 for its portion of the channel.

The project is the result of a study commissioned by Novartis Pharmaceutical Corp., which was ready to pull up stakes and move elsewhere due to the huge costs associated with regular flooding of Belmont Creek.

Novartis hired WRECO, a Bay Area engineering firm with expertise in stream and coastal engineering, to prepare a detailed study of the creek's watershed, which spans the cities of Belmont, San Carlos and Redwood City.

The final project was a collaboration among BCDC, the U.S. Army Corps of Engineers, the Regional Water Quality Control Board and the three cities in the creek watershed.

"Usually, cities and other jurisdictions compete with one another… but for sea level rise they need to collaborate – it's imperative," said Charles Long, co-chair of the Urban Land Institute's Tackling Sea Level Rise initiative.

"The work of BCDC to better prepare for and understand our vulnerability to sea level rise, will help ensure our majestic coastlines and cities are protected for generations to come."

State Senator Mark Leno

The Port of Redwood City is committed to addressing the challenges of sea-level rise through assessing key vulnerabilities and implementing adaptive engineering in collaboration with regional stakeholders.

Port of Redwood City
Serving Silicon Valley

Port Wharves 1&2 and Seawall designed/built in 2014 with sea-level rise adaptive features.

"Sea Level Rise is increasing frequency and severity of flooding along San Francisco's waterfront."

—Chief Harbor Engineer Eunejune Kim

PORT OF SAN FRANCISCO

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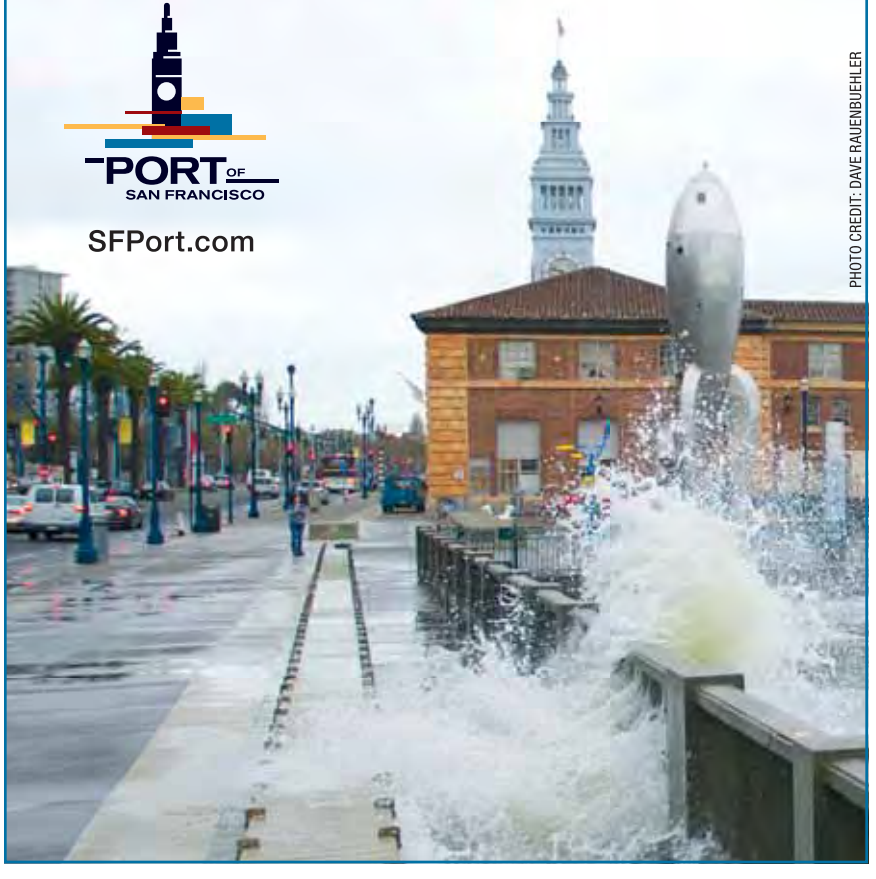
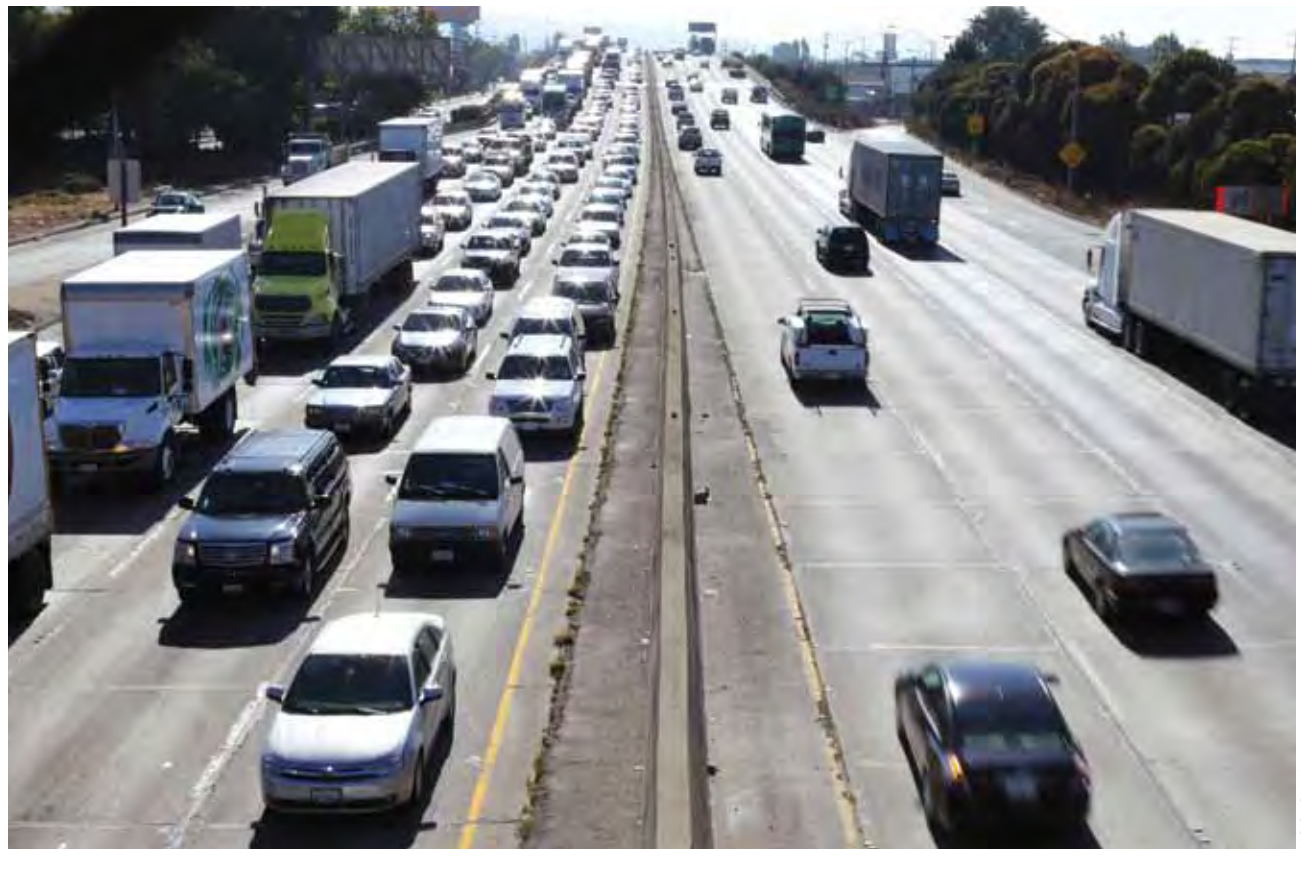


PHOTO CREDIT: DAVE RAUENBUEHLER

Plans to keep the Bay Area moving

"Sea level rise has been described as a slow moving emergency. But every year, as the tides rise higher or the storms become more intense, the risk is greater."

Jim Allison
CCJPA manager of planning



THINKSTOCK

Much of the transportation infrastructure in the Bay Area, including this strech of I-880 near Oakland, is at or near today's sea level.

The nine-county San Francisco Bay Area, home to some 7 million people, is the nation's fifth most populated metropolitan area. A complex public transportation network connects the Bay Area's prosperous businesses, vibrant neighborhoods and productive ecosystem and links the Bay Area to the world and its global markets.

Many of the Bay Area's freeways, tunnels, bridge approaches, seaports, railroads, airports and transit corridors are located near or even below current sea level. There is very little redundancy of regionally significant transportation assets, and where alternatives do exist, many have limited capacity to accommodate additional traffic.

In the event of high tides and storm surges, to say nothing of the long-term implications of sustained sea level rise, the movement of people and goods could, effectively, come to a halt.

Among the challenges faced by transportation systems is the fact they often rely on other agencies or jurisdictions for power, communications, shoreline protection and drainage. They cross city, county and regional lines and are often regulated by multiple agencies.

The Adapting to Rising Tides (ART) program and its partners at the Metropolitan Transportation Commission (MTC), BART and Caltrans District 4 are working with the region's transportation planners, congestion management agencies and local governments to help craft effective adaptation strategies.

Protecting Bay Bridge touchdown

The Bay Bridge touchdown includes the toll plaza as well as the intersection of I-580, I-80 and I-880. Immediately north of the touchdown is the Emeryville Crescent tidal wetland, which currently experiences regular tidal flooding, and Radio Beach, so-called for its three radio towers.

Proposed solutions for protecting the area include improving drainage, retrofitting the toll plaza to elevate water-sensitive elements, constructing a breakwater off Radio Beach and building a living levee immediately north of the touchdown.

The advantages of a "living levee" over a more traditional structure include a flatter seaward slope that can be planted to create a marsh habitat that would both dissipate wave energy and accommodate wildlife. If necessary, the levee could be raised to accommodate future conditions.

Other possible adaptations include raising the road in areas especially prone to flooding and elevating the entire freeway above 100-year flood levels.

Policy makers are looking at changes to building codes, modifying design guidelines and planning policies and establishing multi-jurisdictional partnerships that can plan for and fund adaptation strategies.

Living levees at Coliseum & Amtrak

The area around the Oakland Coliseum complex, including the Coliseum BART station and new BART airport connector, Jack London Square Amtrak station and a section of I-880, is vulnerable to both current and future flooding.

One option is a living levee along each side of Damon Slough. Additional protection would need to be placed along the north edge of the slough to protect BART and Amtrak. The levees would also provide some protection for I-880.

Levees provide a flexible adaptation, as they could be raised if necessary at a later date.

PHOTO COURTESY OF SFO

Seawalls, levees and berms, such as this one at San Francisco International Airport, can be constructed to protect low-lying areas.

BART adaptations

The Bay Area Rapid Transit (BART) system is the backbone of the Bay Area's regional and local public transportation network and an essential part of the region's economy and quality of life. BART, with 44 stations and more than 100 miles of track, serves some 350,000 riders daily.

Inspired by BCDC's Adapting to Rising Tides project, and supported by the Federal

Transit and Highways administrations, BART is taking a comprehensive planning approach to adaptation strategies.

"We are mainstreaming the concerns we have about rising sea levels into our day-to-day priorities and the criteria for capital investments," says BART's chief architect, Tian Feng. BART is also looking at physical changes that can make underground stations, power and tracks more resilient to potential flooding and seepage.

As an example, BART is investing in upgrades to train control systems, such as new or retrofitted roofing and wall systems, to make them more resilient to water intrusion. Projects are underway at the Daly City and San Leandro train control rooms.

"More importantly," says Feng, "we're developing new guidelines and standards for building and modernizing BART infrastructure to make it more resistant to sea level change and heavy downpours."

"We also want to look at additional scenarios and analyze the impact on different parts of the system," says Feng, "as well as looking in depth at specific assets – stations, tracks, power stations – and at each element within those assets."

It's important that BART work with local jurisdictions to ensure sufficient capacity of local storm drain systems, installing one-way drain valves to prevent backflow, simplifying maintenance reports to more quickly identify "trouble spots" and keeping on-site roof and drain systems in good working order.

Capitol Corridor highly vulnerable

The Capitol Corridor 171-mile rail line, connecting Sacramento to Oakland and San Jose, has more linear exposure to the threat of sea level rise than any transit provider in the Bay Area.

Long stretches of the route run along waterfronts, through marshland or on soils that are increasingly vulnerable to earthquakes and rising seas.

"At risk are tracks, rail beds and signals," says Shirley Qian, a planner with the Capitol Corridor Joint Powers Authority.

As the CCJPA looks to add track to expand capacity between Oakland and San Jose, planners are aware of the need to measure sea level design against the lifespan of the project design.

"Sea level rise has been described as a slow moving emergency," says CCJPA's Manager of Planning Jim Allison. "But every year, as the tides rise higher or the storms become more intense, the risk is greater."

A more immediate threat is the ever-rising groundwater table.

"In effect, sea level rise is upon us now," says Allison. "At some point, the maintenance frequency will become excessive and could cause a more intensive capital project to come to the rescue."

"By starting now, BCDC is giving us all a chance to respond in a better way – the way the Bay Area can do historically with its other challenges, like earthquake safety – to the required responses to adapting to sea level rise. If that is not helping the region, I don't know what is."

"The biggest challenges cities face in terms of sea level rise are regional. We critically need the leadership provided by regional agencies like BCDC because no city can go it alone."

San Jose Mayor Sam Liccardo

Regional airports prepare for high waters

The Bay Area's global economy and quality of life are highly dependent on the region's three major international airports: Oakland, San Jose and San Francisco. Two of those, Oakland and San Francisco, are projected to face significant challenges posed by rising sea levels and storm surges.

Oakland International Airport (OAK)

The Oakland International Airport (OAK), owned and operated by the Port of Oakland, is built on 2,600 acres bordered on three sides by San Francisco Bay. Its largest commercial runway is built on Bay fill.

Currently, the airport is protected by tide gates, levees and recently upgraded pump systems, but by 2050, with projected rises in sea level, higher tides and big storms, these structures could be overtopped by wind waves and surging seas.

"We are planning the best ways to protect Oakland International Airport from future rising waters," says Richard Sinkoff, Port of Oakland director of environmental programs and planning. "We've completed a vulnerability assessment of the perimeter dike and are working on a design for rebuilding the perimeter wall around OAK to address seismic risk and sea level rise."

Using a projected 16 inches of sea level rise in the region for 2050, the airport's general aviation facilities and the North Field runway could be inundated if there were also a concurrent extreme storm event. Doolittle Drive provides more than 12 inches of protection above the current daily high tide.

With 36 inches of sea level rise, as predicted by the NRC for 2100, North Field could be underwater daily. If this sea level rise were accompanied by a 100-year storm, it could also inundate the South Field, but only if the Port were to take no action.

Low-lying San Francisco International Airport is in danger of inundation without mitigation measures.

The threat of disruption is heightened by OAK's dependence on connecting roads that are at risk of flooding, although it would take at least 24 inches of sea level rise and an extreme storm to impact access roads and the South Field runway.

Any amount of flooding could affect OAK's ability to handle some of its cargo and passenger flights. More than 10 million passengers use OAK annually. Its air cargo traffic is the busiest in the Bay Area and 13th in the U.S. in terms of tonnage.

CONTINUED ON PAGE 15

The vital role of wetlands

Baylands are a critical first line of defense against flooding and a rapidly vanishing habitat for wildlife

PHOTO COURTESY OF COASTAL CONSERVANCY

A snowy egret surveys the Hamilton wetlands, where wildlife is again flourishing.

Wetlands prevent flooding by holding water much like a sponge. Over the past 200 years, the intertidal mudflats and tidal marshes around San Francisco Bay (referred to as baylands), have vanished at an alarming rate. It's estimated that 95 percent of the Bay's historic tidal wetlands have been destroyed. The loss of baylands hampers their function in acting as a natural water filtration system, providing a habitat for fish and other wildlife and flood protection.

The baylands serve as a buffer between the Bay and shoreline development. As waves move across these relatively flat areas of shallow water and plants, their height and energy are reduced, which helps protect inland coastal communities from flooding.

In addition, baylands trap sediments, which reduces the buildup in deep water channels, and absorb atmospheric pollutants. They provide an important habitat for plant and animal communities, are an essential feeding and resting place for migratory birds and provide important open space and recreational opportunities.

"Nature-based adaptation is an opportunity to leverage natural processes to build resilience," says Sarah Richmond, coastal planner for BCDC.

"We can't breach a levee, grade a trail and walk away anymore. We have to think about a shoreline that will continually change and we need to start now because it takes time to fund, plan and permit multi-benefit projects that can adapt to changing conditions."

The resilience of baylands to sea level rise depends on their ability to build upward and move landward. Baylands will drown if they do not keep pace with accelerating sea level rise, and the flood risk-reduction benefits they otherwise provide will be lost. Preserving, enhancing and restoring these natural barriers to flooding can reduce the future costs of repairing, raising or building structural shorelines in the face of sea level rise.

A pioneering wetland adaptation project undertaken by BCDC in lower Corte Madera Creek has shown that while the Corte Madera baylands have been keeping pace with the current rate of sea level rise, it may be difficult for them to keep up with an accelerated pace.

The Corte Madera study confirms that protecting and enhancing baylands requires a better understanding of how sediment is transported, completing more field studies to calibrate and validate marsh wave attenuation models at distinct points around the Bay, and integrating baylands management into coastal hazard mitigation to support better planning.

Former Hamilton Airfield now a flourishing wetland

PHOTO COURTESY OF COASTAL CONSERVANCY

The Hamilton wetlands after restoration.

The once-bustling Hamilton Airfield runways in Marin have been transformed into a flourishing, 650-acre wetland with thousands of native plants taking root and native wildlife finding new refuges in tidal and seasonal marshlands.

The $200 million project, advanced by the State Coastal Conservancy and the U.S. Army Corps of Engineers, and permitted by BCDC, involved breaching an old levee built to keep the waters of San Pablo Bay off the airfields. Mud from dredging at the Port of Oakland was used to raise the ground surface to sea level.

Like the restoration of wetlands at Oakland's Middle Harbor, the Hamilton project is an example of the effective re-use of natural material.

The Hamilton wetlands, like other projects around the Bay, took a collaborative effort. Eleven government agencies, four military organizations, and dozens of neighborhood and environmental groups were involved in the decades of planning. Construction began in 2008 and was completed last year.

The new design includes about 400 acres of tidal wetlands, and 76 acres of seasonal wetlands. As the Bay rises, the tidal wetlands will migrate into the seasonal wetlands and continue to provide critical habitat. The rest of the acreage is dry.

The restoration is giving new life to many species of fish, the Ridgeway's Rail, ducks, hawks, the salt marsh harvest mouse, Chinook salmon, snowy egrets and great blue herons that once flourished in the area.

"BCDC's expertise and planning ability has made it the clearing house for information on the risks of sea level rise, a resource to local jurisdictions and the convener of public and private entities to work together to address the issues."

Supervisor John Gioia,
Contra Costa County District 1, Board of Supervisors Chair and BCDC Commissioner

CONTINUED FROM PAGE 13

The airport supports thousands of jobs directly through its operations and indirectly via the industries that depend on a functioning airport, from rental car agencies to hotels, retailers and other visitor-serving businesses.

"As jurisdictions and agencies around the Bay work on these projects, we're creating a 'regional toolbox' of design policies and engineering solutions," says Sinkoff.

San Francisco International Airport (SFO)

Last year, 47 million passengers traveled through SFO. In addition, SFO generates more than 36,400 direct airport jobs and $6.3 billion in business activity. If extended to offsite business that's directly dependent on SFO, the airport's economic impact expands to 155,000 jobs and $35 billion in sales.

Clearly, any disruption to service at the airport would have an enormous impact on the Bay Area.

Even under current conditions, SFO, with its eight miles of shoreline, is challenged to keep runways dry and safe. Annual King Tides can overtop flood protection structures and inundate low-lying areas.

"The good news is we have time to evaluate our options and implement strategies," says Doug Yakel, SFO's public information officer. "Now we need to figure out what will work best for the airport, how to integrate our work with what our neighbors are doing and how we can fund mitigation activities."

The threat of flooding along Hwy. 101, for example, underscores the need for a broader approach.

"If passengers can't get to and from the terminals," says Yakel, "it would negate any stand-alone work we may have done."

Earlier this year, SFO completed a study that's helping planners better understand the improvements needed to protect the airport from a 100-year flood and sea level rise.

"BCDC's been a very good resource," says Yakel.

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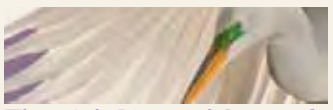

The 12th Biennial State of the Estuary Conference
www.sfestuary.org/soe

Global sustainability leader is keynote at BCDC summit

McDonough

William McDonough, a globally recognized leader in sustainable development, is the keynote speaker for BCDC's "Sink or Swim" summit on September 16 at the Exploratorium.

The summit, which is by invitation only, will celebrate BCDC's 50 years of leadership and kick off their campaign to address the impacts of climate change on San Francisco Bay and how to make the Bay shoreline resilient in the face of rising sea levels.

McDonough's remarks are designed to inspire policy makers, industry leaders and Bay advocates to see rising sea levels as an opportunity for innovation. Solutions, he suggests, will only come from engaging everyone – from developers and designers to the community at large.

In 1996, McDonough received the Presidential Award for Sustainable Development. In 2003, he earned the first U.S. Environmental Protection Agency's Presidential Green Chemistry Challenge Award. In 2002, McDonough and Michael Braungart co-authored *Cradle to Cradle: Remaking the Way We Make Things*, followed by *The Upcycle: Beyond Sustainability – Designing for Abundance* in 2013.

McDonough leads and chairs the World Economic Forum's Meta-Council on the Circular Economy and is also active with William McDonough + Partners, his architecture practice, with offices in San Francisco and Charlottesville, Virginia.

The summit's panel of speakers also includes: Mary Huss, publisher, *San Francisco Business Times*; Greg Dalton, Climate One/Commonwealth Club; John Laird, Secretary, California Natural Resources Agency; David Lewis, executive director, Save the Bay; Elizabeth Ranieri, Kuth Ranieri Architects; Gabe Metcalf, executive director, SPUR; Mike Ghielmetti, founder and president, Signature Development Group; and Kate Lydon, public sector portfolio director, IDEO.

Rising to the Challenge stories by Carol Piasente; Design by Carol Collier

The Bay Planning Coalition (BPC) celebrates the 50 years of success of BCDC.

WORKING COLLABORATIVELY, WE FIND MUTUAL SUCCESS.

Bay Planning Coalition

BPC is a broad coalition that advocates for sustainable commerce, industry, infrastructure, recreation and the natural environment connected to the San Francisco Bay and its watershed.

For more information about BPC, please call 510-768-8310, or go to our website, www.bayplanningcoaltion.org.