

# SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

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## Resolution No. 11-08

### **Adoption of Bay Plan Amendment No. 1-08 Adding New Climate Change Findings and Policies to the Bay Plan; And Revising the Bay Plan Tidal Marsh and Tidal Flats; Safety of Fills; Protection of the Shoreline; and Public Access Findings and Policies**

**Whereas**, Government Code Section 66652 states that “the Commission at any time may amend, or repeal and adopt a new form of, all or any part of the San Francisco Bay Plan but such changes shall be consistent with the findings and declaration of policy” contained in the McAteer-Petris Act; and

**Whereas**, the *San Francisco Bay Plan* (Bay Plan) policies pertaining to sea level rise and climate change have not been reviewed and updated comprehensively since their adoption in 1989; and

**Whereas**, the Commission’s strategic plan included the initiation of the review and possible update of the Bay Plan findings and policies concerning climate change; and

**Whereas**, between 1850 and 1960, one-third of San Francisco Bay was diked, filled or reclaimed as land. Alarmed by projections that as much as 70 percent of the remaining Bay might be lost by 2020, in 1965 the California Legislature passed the McAteer-Petris Act to create a new temporary state agency—the San Francisco Bay Conservation and Development Commission (BCDC). The new law directed BCDC to prepare a plan for the long-term use and protection of San Francisco Bay. The Commission delivered its *San Francisco Bay Plan* to the Legislature on time and under budget in 1968. The plan contained findings and policies the Commission recommended be used to guide future regulatory decisions on activities in and around the Bay. In 1969, the Legislature made BCDC a permanent state agency, adopted the Bay Plan by reference into state law, and directed the Commission to use the Bay Plan findings, policies and maps to guide the Commission’s regulatory decisions on permit applications for development and other activities within BCDC’s jurisdiction; and

**Whereas**, the Bay Plan includes findings and policies on 26 subject areas ranging from water quality and weather to commercial fishing and airports. All of the policies have equal status, and every BCDC permit decision must be consistent with all applicable policies. However, the policies are applied on a case-by-case basis to the specific conditions of that site where a project is proposed and the nature of the proposed project. As a result, not all of the policies apply in all situations. For example, the policies on dredging are not relevant to a proposed development project located entirely on existing land along the shoreline, and the policies on ports are not applied to a wetlands restoration project proposed in a salt pond; and

**Whereas**, in addition to serving as mandatory state policies that are enforced by the Commission through its regulatory authority, some the Bay Plan policies are declarations of the Commission’s intention to undertake future studies or planning, and others offer advice to local governments, other agencies and organizations in dealing with Bay management issues. However, both state law and the Bay Plan stipulate that any such recommendations are advisory only and cannot be enforced by the Commission; and



**Whereas**, the Legislature directed the Commission to keep the Plan up-to-date so that it reflects the latest scientific research on the Bay and addresses emerging issues that could impact the Bay in the future. To accomplish this, the Legislature empowered the Commission to amend the Bay Plan if two thirds (18) of the 27 members of the Commission vote for the amendment, after providing an opportunity for public review of the proposed amendment and after holding a public hearing on the amendment. Over the past 42 years, the Commission has made numerous amendments to the Bay Plan, some of which dealt with simple matters, such as changing a boundary of a Plan map designation, and some of which have addressed major issues, such dredging and dredged material disposal; and

**Whereas**, the initial step in revising the Bay Plan is a policy decision by the Commission whether to consider an amendment dealing with a specified issue. Thereafter, the staff prepares a report containing the results of research and policy analysis on the issue, preliminary recommended findings and policies and an environmental assessment of the proposed amendment. One such staff report entitled, *Sea Level Rise: Predictions and Implications for San Francisco Bay*, was released in December 1987. Relying on this report in 1989, the Commission amended the findings and policies in the section of the Bay Plan dealing with Safety of Fills, making BCDC one of the first public agencies in the country to address the issue of sea level rise when making permit decisions and to provide policy advice to local governments; and

**Whereas**, perhaps the biggest change in the twenty years since the Commission first adopted sea level rise policies is the attention received by the international, consensus-based approach to delivering scientific conclusions for policy-makers initiated by the United Nations Intergovernmental Panel on Climate Change (IPCC). Because the IPCC represents a wide range of scientific opinion, its conclusions are generally conservative, but widely accepted. However, another important change in the last twenty years is that the effects of climate change are already being observed. Conclusions in both the IPCC and state-sponsored work are based, in part, on observed changes in global surface temperature, ocean water temperature, ocean acidification, and land and sea ice melt. Finally, what was lacking twenty years ago was conclusive evidence that climate change is caused largely by human actions—primarily the release of carbon dioxide into the atmosphere. Today, such evidence solidly links the significant human contribution to greenhouse gases, beginning with industrialization, to increases in global temperature; and

**Whereas**, in 2006, the State of California used IPCC scenarios to develop a report on climate change impacts in the state. In that same year, the legislature passed the Global Warming Solutions Act requiring reductions in greenhouse gas emissions. The most recent update to the IPCC assessment reports was in 2007 and, in 2008, the state reported the results of an updated analysis of climate change scenarios. Both reports conclude that the reduction of greenhouse gases now will reduce the degree to which the world must adapt to the effects of climate change. However, it is inevitable that over the next century global temperatures will increase 1° to 3° C (1.8° to 5.4° F). To deal with this increase in temperature, adapting to climate change and its impacts is both unavoidable and essential; and

**Whereas**, three years ago, the Commission decided to again deal with the issue of sea level rise within the larger context of global climate change. To accomplish this, in November 2008, the Commission initiated the process of considering Bay Plan Amendment No. 1-08 by authorizing the staff to propose amendments of the findings and policies in four sections of the Bay Plan—Tidal Marshes and Tidal Flats, Safety of Fills, Protection of the Shoreline, and Public Access—and to develop additional findings and policies in an entirely new section to the Plan entitled Climate Change.

**Whereas**, in April 2009, the staff released a report entitled *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on the Shoreline*. In addition to providing extensive background information on the most current scientific research on climate change, the report contained maps depicting the low-lying areas around the Bay that could be vulnerable to future flooding from sea level rise and storm surge. Along with the background report, the staff provided a preliminary recommendation on proposed Bay Plan amendments to address climate change; and

**Whereas**, the background report indicated that while the rate of global climate change will depend on the volume of future greenhouse gas emissions, sea level rise in San Francisco Bay could be as much as 16 inches by mid-century and 55 inches by the end of the century. By mid-century, 180,000 acres of Bay shoreline could be vulnerable to flooding, and 213,000 acres vulnerable by the end of the century. The area vulnerable to inundation with a 16-inch sea level rise roughly corresponds to today's 100-year floodplain. The economic value of Bay Area shoreline development at risk from a 55-inch rise in sea level is estimated at \$62 billion—nearly double the estimated value of development vulnerable to sea level rise along California's Pacific Ocean coastline. An estimated 270,000 people in the Bay Area would be at risk of flooding from a 55-inch rise in sea level, 98 percent more than are currently at risk from flooding; and

**Whereas**, the Commission held its first public hearing on the preliminary staff recommendation on May 7, 2009. To respond to requests for more time for public review and input, the Commission held three more public hearings, held three public workshops and kept the public comment period open for three months. The staff revised its preliminary recommendation to address the public comments and incorporate suggestions that had been made to improve the amendment language, and a revised preliminary recommendation was released on October 1, 2009. The Commission held another public hearing on the revised preliminary staff recommendation on November 5, 2009, and another public workshop on December 3, 2009; and

**Whereas**, a third staff recommendation and response to comments was released on September 3, 2010. The Commission held eight public hearings on this draft during the fall of 2010, and the staff worked with local governments, business interests and environmental organizations to further refine the amendment language. In all, since April 2009, the Commission has held 35 public hearings, workshops and meetings on the amendment language as it has evolved, and the Commission will hold another public hearing on September 1, 2011 before voting on the amendment on October 6, 2011; and

**Whereas**, five principal policy goals will be achieved by adopting proposed Bay Plan Amendment No. 1-08.

1. Outdated language on sea level rise policy that has been in the Bay Plan since 1989 will be eliminated. This current policy language recommends that new development not be approved in low-lying areas that are in danger of flooding now or in the future unless the development is elevated above possible flood levels. The amended policies allow protection from flooding, encourage innovative means of dealing with flood danger, and make it clear that local governments will determine how best to deal with development proposals inland of the Commission's jurisdiction.
2. A variety of types of projects that have regional benefits will be encouraged, and proposed new development will continue to be evaluated by the Commission on a case-by-case basis to determine if the benefits of a project outweigh the risk from flooding and to ensure steps are taken to deal with the flooding danger.

3. The Bay and other valuable natural resources within BCDC's jurisdiction will continue to have the same level of protection that has worked so well for the past half-century.
4. Because wetlands play vital roles in both reducing greenhouse gases and providing flood protection, existing tidal wetlands will continue to be protected and, where appropriate, expanded. To accomplish this, resource protection and habitat enhancement in undeveloped low-lying areas will be encouraged, but development will not be absolutely prohibited in these areas.
5. The Commission will commit itself to working with its regional partners, local governments, businesses, labor, environmentalists, investors, insurers, and the general public to develop a comprehensive regional strategy that deals with all the impacts of climate change. Such a strategy is essential to the Bay Area's long-term economic prosperity; and

**Whereas**, in addition to concerns that have been expressed about specific language in the proposed findings and policies, there has been considerable concern expressed about the maps of shoreline areas that are potentially vulnerable to flooding from sea level rise and storm surge. These maps can be found in both the staff background report and on the Commission's website; and

**Whereas**, at the most basic level, the maps depict areas around the Bay that have low elevations. Overlays compare these ground elevations with projected Bay water depths that are 16 inches (0.4 meter) and 55 inches (1.4 meters) higher to illustrate possible sea levels around the middle of the 21st century and the beginning of the 22nd century. The maps do not take into account wind and waves that would increase the extent of inundation, and do not show existing levees that might provide protection from flooding, because detailed information on wind and wave conditions and levee heights and strengths was not available at a regional scale. Nor do the maps show where new levees or other shoreline protection to prevent flooding could be built, or the cost of any such protection. These limitations of the maps are reflected in the following legal disclaimer on each map:

"Inundation data does not account for existing shoreline protection or wave activity. These maps are for informational purposes only. Users, by their use, agree to hold harmless and blameless the State of California and its representatives and its agents for any liability associated with its use in any form. The maps and data shall not be used to assess actual coastal hazards, insurance requirements, or property values or be used in lieu of Flood Insurance Rate Maps issued by the Federal Emergency Management Agency (FEMA)."

Despite efforts to make it clear that the maps simply show low land elevations in relation to possible future water depths, three types of objections to the maps have been raised. The first is that the presence of the maps is inhibiting capital from being invested in what critics call the "inundation zone" around the Bay. While it may be true that some investors may be more cautious about supporting development around the Bay, the maps are not the cause of concern. As noted, the maps simply depict areas around the Bay that have low elevations in relation to projected water depths. These elevations will be the same whether or not BCDC's maps exist. Similar maps have been published by the U.S. Geological Survey, the California Energy Commission, the Pacific Institute, and others; and

**Whereas**, the second objection to the maps is that they depict the area over which BCDC intends to exert regulatory authority even though the maps will not be adopted as part of the Bay Plan and, therefore, cannot be used by the Commission in making regulatory decisions; and

**Whereas**, the Commission's "Bay" jurisdiction extends to the Mean High Tide line, an elevation that is established by the National Oceanic and Atmospheric Administration. If nothing is done to protect low-lying areas around the Bay, over time these areas could become flooded and eventually fall within BCDC's jurisdiction. With this in mind, some have conjectured that BCDC intends to extend its jurisdiction over this area now. This simply is not true. BCDC cannot change its jurisdiction without a change of state law, and BCDC has not requested such a change. And even if an area becomes flooded by Bay waters, BCDC has a legal obligation to notify a landowner of the flooding, and the landowner then has a year to repair any levee or other shoreline protection. If these repairs are made, BCDC's jurisdiction remains unchanged. If the area has no pre-existing shoreline protection, the proposed policies in Bay Plan Amendment No. 1-08 would allow the construction of such protection; and

**Whereas**, the third objection raised about the maps is that the Commission could use its authority under the federal Coastal Zone Management Act and the California Environmental Quality Act to exert jurisdiction over development proposals within the low-lying areas around the Bay that are vulnerable to future flooding and to pre-empt local government control. The Commission never had any such intention. Rather, the Commission's intention is to adopt Bay Plan Amendment No. 1-08, pursuant to the provisions of the McAteer-Petris Act and the Suisun Marsh Preservation Act of 1977. The Amendment is not intended to, and does not increase or decrease BCDC's jurisdiction or authority under either act. To express this intention and to reassure critics, proposed Bay Plan Climate Change Policy 1 was drafted in consultation with the Attorney General's staff and attorneys representing the business community, labor and local governments. Proposed Climate Change Policy 1 explicitly states that the climate change findings and policies will apply only within BCDC's current jurisdiction, that local governments will retain their authority over development more than 100 feet inland from the Bay shoreline, and that the provisions of the Bay Plan do not apply outside the Commission's jurisdiction for purposes of implementing the California Environmental Quality Act. Proposed Policy 1 also responds to public comments requesting that the Commission restrict the use of the policies for Coastal Zone Management Act consistency determinations; and

**Whereas**, on November 18, 2010, the Commission considered, six possible Optional Strategic Approaches for Dealing with Proposed Bay Plan Amendment No. 1-08 Concerning Climate Change to respond to concerns about the third preliminary staff recommendation:

1. Revise the proposed language in response to comments from the public as part of the process of updating the 21-year-old sea level rise findings and policies in the Bay Plan and adding a new section to the Plan to deal more broadly with climate change and adapting to sea level rise to address concerns that the proposed amendments would vastly increase BCDC's regulatory authority, usurp local autonomy, institute a moratorium on development in low-lying areas, and block all development.
2. Abandon the process of updating the Bay Plan and leave the current sea level rise findings and policies in place.
3. Amend the Bay Plan to delete the current sea level rise findings and policies.
4. Amend the Bay Plan to update the current sea level rise findings and policies in a new section dealing with climate change to clearly specify that the new provisions will be used exclusively to guide the Commission in making regulatory decisions within its permit jurisdiction and are not intended to be advisory for local governments.
5. Amend the Bay Plan to update the current sea level rise findings and policies in a new climate change section that calls only for the preparation of a long-term regional sea level rise adaptation strategy, and not include any interim guidance for the Commission or advice for local governments.

6. In combination with any of the options above, develop a guidance document that can be used by the Commission, local governments and others when dealing with sea level rise. The document would explicitly state that the guidelines are not binding or enforceable.

At its December 2, 2010 meeting, after receiving public comment on the six options, the Commission directed the staff to prepare a revised recommendation that would propose findings and policies that are exclusively for the Commission's use in carrying out BCDC's regulatory responsibilities within its current permit jurisdiction (Option 4). The Commission postponed to 2011 a decision on whether and in what form any guidance or advice will be provided for dealing with sea level rise outside BCDC's regulatory jurisdiction. To date, the Commission has not provided any additional direction with respect to preparing stand-alone guidelines for local governments; and

**Whereas**, on December 16, 2010, the Commission considered another Staff Report on Policy Alternatives for Bay Plan Amendment No. 1-08 Concerning Climate Change that considered a range of possible alternative approaches for addressing comments and issues raised during the public hearings on the third preliminary recommendation. The staff report discussed (1) the preparation of risk assessments for planning shoreline areas and designing larger projects within the Commission's permit jurisdiction; (2) the preparation of a regional adaptation strategy to address sea level rise; and (3) limiting development in low-lying areas within the Commission's jurisdiction to a broad list of project types. The Commission considered a range of alternatives for each of these policies and directed staff to utilize the discussion and public input to modify the staff recommendation; and

**Whereas**, over the course of the Commission's consideration of Bay Plan Amendment No. 1-08, various alternatives for dealing with sea level rise were advanced. Environmental organizations recommended that state legislation should be enacted to give BCDC regulatory jurisdiction over all low-lying areas around the Bay affected by sea level rise. The California Climate Adaptation Strategy recommends that state agencies should consider prohibiting projects that would place development in undeveloped areas containing critical habitat or containing opportunities for tidal wetland restoration. Business groups and local governments suggested the Commission should not amend the Bay Plan at all until the economy improves and there is more certainty about the impacts of climate change. The Commission considered these ideas but selected a more moderate course of action—one that will provide the Commission with updated policies for regulating development within BCDC's jurisdiction to address the impacts of sea level rise and will commit the Commission to working in partnership with all stakeholders on a comprehensive and long-range climate change resilience strategy for the Bay Area; and

**Whereas**, the San Francisco Bay Conservation and Development Commission: (1) on November 5, 2008 approved a Descriptive Notice of the proposed Bay Plan amendment and set the public hearing date for February 5, 2009; (2) on November 6, 2008 distributed the Adopted Descriptive Notice and notice of the public hearing to all agencies, organizations and individuals interested in the proposed amendment; (3) rescheduled the public hearing to May 7, 2009, with a public notice mailed on January 23, 2009; (4) Mailed the staff background Report "Living with a Rising Bay" and the first staff preliminary recommendation and environmental assessment on April 7, 2009 to all agencies, organizations and individuals interested in the proposed amendment (interested parties); (5) held a public hearing on May, 7<sup>th</sup>, June 4<sup>th</sup>, and July 16<sup>th</sup>, 2009 pertaining to proposed Bay Plan policy language changes and received comments on the background report, preliminary recommendation and environmental assessment sent on April 7, 2009 and the hearing was closed on July 16<sup>th</sup>; (6) on October 1, 2009, staff distributed a revised (second) preliminary staff recommendation and response to comments to all agencies, organizations and individuals interested in the proposed amendment; and (7) the Commission held and closed a public hearing on November 5, 2009 and; (8) Mailed a

third preliminary staff recommendation and response to comments to the Commission and interested parties on September 3, 2010; (9) The Commission held six public hearings (October 7 and 21; November 2, 4, and 18; and December 2, 2011) on this draft and the Commission closed the public hearing on December 2, 2011 and closed the written comment period on December 17, 2010; (10) on July 29, 2011, the staff mailed a fourth preliminary recommendation, revised environmental assessment and response to comments on the third staff preliminary recommendation to the Commission and interested parties; (11) on September 1, the Commission held and closed a public hearing on staff's recommendation; (12) on September 23, 2011, staff mailed a final recommendation, including a response to comments on staff's fourth preliminary recommendation, which included revisions to the staff background report "Living with a Rising Bay" incorporating changes based on comments received during prior public hearings and changes in scientific information during the lengthy amendment process all to the Commission and interested parties; and (13) On October 6, 2011, the Commission voted on the staff's final recommendation; all in accord with the requirements and procedures set out in Government Code Section 66611 and 66652 and the California Code of Regulations, Sections 11000, 11001, 11003, 11004, and 11005; and

**Whereas**, throughout the three-plus year plan amendment process, the staff and Commission held numerous meetings and workshops outside of the formal public hearing and public review process with local governments; business, environmental, social equity, and flood control groups throughout the region to answer questions and receive comments on the many staff recommendations and to devise alternative policy approaches; and

**Whereas**, on May 15, 2009, the staff presented to the Joint Policy Committee (JPC) its recommended updates to the Bay Plan findings and policies and recommended that the JPC support the proposed Bay Plan updates and agree to play a key role in developing a regional strategy to address the Bay-related impacts of climate change. On July 17, 2009, the staff presented the findings and policies again to the JPC and the JPC unanimously agreed it should play a key role in developing regional sea level rise policies and endorsed the general policy direction of the Bay Plan amendments proposed by BCDC, subject to the refinement of the exact language to incorporate public comment and to encourage a context sensitive policy approach and innovation in those situations which merit special attention; and

**Whereas**, the San Francisco Bay Conservation and Development Commission has evaluated the environmental impact of revising the San Francisco Bay Plan by adding new climate change finding and policy section and modifying the tidal marsh and tidal flats, safety of fills, protection of the shoreline and public access findings and policies, under the Commission's functional equivalency regulations authorized by Public Resources Code Section 21080.5, and finds that all avoidable significant adverse environmental impacts as a result of the amendment to the Bay Plan recreation policies, as well as changes to the Plan Map Policies and Plan Map notes are reduced to a less than significant level and that, therefore the amendment to the recreation policies, as well as changes to the Plan Map Policies and Plan Map notes will have no significant environmental impact; and

Amending the Bay Plan is only a preliminary first step to project review. Each project that comes before the Commission requires further environmental review, and specific or potential environmental impacts can be identified and mitigated at subsequent stages. The amendments do not commit the Commission to approve or disapprove any particular project or any particular type of project. They do not specify a particular land use for any area of land. At this stage it is not known what projects will be undertaken under the Bay Plan amendments, where they will be located, or what impacts they will have on the Bay. The impacts of any particular future development project are speculative.

Because the Bay Plan amendments do not authorize physical alterations or commit the Commission to approve or deny any particular future physical alteration, the impacts of the amendments at this stage are very limited in scope and effect. The potential impacts of projects to be considered by the Commission in the future are highly speculative. The Commission will be able to conduct a more detailed review to determine the impacts of specific projects undertaken pursuant to these policies if and when they are proposed on a case-by-case basis. The proposed amendments improve the Commission's program for protecting the environment within its jurisdiction, including the built and natural environments. Finally, the amendments do not substantially alter the extent to which BCDC may address environmental impacts in permitting decisions under its existing laws and policies that protect the Bay. Indeed, the amendments provide the Commission with additional tools to address environmental impacts of future projects. Therefore, adoption of these amendments does not have significant adverse environmental effects.

**Whereas**, the amendment to the Bay Plan, including the addition of a new climate change finding and policy section and amendments to the tidal marshes and tidal flats, safety of fills, shoreline protection and public access findings policies, enacted by this resolution is intended to be a revision in the Commission's coastal management program for the San Francisco Bay segment of the California coastal zone as approved by the U.S. Department of Commerce under the federal Coastal Zone Management Act of 1972, as amended; and

**Whereas**, global climate change has been described as one of the most challenging problems ever faced by humans. The quality of the lives of future generations depends on how the current generation deals with this challenge. The course outlined in Bay Plan Amendment No. 1-08 is an initial, cautious and modest step in the long journey the people of the Bay Area will need to take to ensure that our region remains viable, sustainable and prosperous in the future and that our beloved San Francisco Bay continues to be protected; and

**Whereas**, these amendments are adopted pursuant to the McAteer-Petris Act (Gov. Code §§66600 et seq.) and the Suisun Marsh Preservation Act of 1977 (Pub. Res. Code §§29000 et seq.), and they are not intended to, and do not, increase or decrease BCDC's jurisdiction or authority under either act.

**Now, Therefore, Be it Resolved That**, the San Francisco Bay Conservation and Development Commission authorizes the Executive Director to make minor, non-substantive editorial changes to this Resolution, in particular to comply with the determinations of the Office of Administrative Law in its review of the Resolution under the California Administrative Procedures Act; and

**Be it Further Resolved That**, the San Francisco Bay Conservation and Development Commission hereby adopts Bay Plan Amendment No. 1-08 which amends the Bay Plan as follows:

1. Amends the Bay Plan tidal marshes and tidal flats findings and policies with the underlined language added and the ~~strikethrough~~ language deleted, as follows:

**Tidal Marshes and Tidal Flats**

**Findings**

- g. The Baylands Ecosystem Habitat Goals report provides a regional vision of the types, amounts, and distribution of wetlands and related habitats that are needed to restore and sustain a healthy Bay ecosystem, including restoration of 65,000 acres of tidal marsh. These recommendations were based on conditions of tidal inundation, salinity, and sedimentation in the 1990s. While achieving the regional vision would help promote a healthy, resilient Bay ecosystem, global climate change and sea level rise are expected to

alter ecosystem processes in ways that may require new, regional targets for types, amounts, and distribution of habitats.

- i. Tidal marshes are an interconnected and essential part of the Bay's food web. Decomposed plant and animal material and seeds from tidal marshes wash onto surrounding tidal flats and into subtidal areas, providing food for numerous animals, such as the Northern pintail. In addition, tidal marshes provide habitat for insects, crabs and small fish, which in turn, are food for larger animals, such as the salt marsh song sparrow, harbor seal and great blue heron. Diking and filling have fragmented the remaining tidal marshes, degrading the quality of habitat and resulting in a loss of species and an altered community structure.
- k. Landward marsh migration may be necessary to sustain marsh acreage around the Bay as sea level rises. As sea level rises, high-energy waves erode inorganic mud from tidal flats and deposit that sediment onto adjacent tidal marshes. Marshes trap sediment and contribute additional material to the marsh plain as decaying plant matter accumulates. Tidal habitats respond to sea level rise by moving landward, a process referred to as transgression or migration. Low sedimentation rates, natural topography, development, and shoreline protection can block wetland migration.
- kl. Sedimentation is an essential factor in the creation, maintenance and growth of tidal marsh and tidal flat habitat. However, scientists studying the Bay estimate have observed that sedimentation will not be able to keep pace with accelerating sea level rise, due largely to declines in the volume of sediment entering the Bay annually from the Sacramento and San Joaquin Delta is declining. As a result, the importance of sediment from local watersheds as a source of sedimentation in tidal marshes is increasing. As sea level rise accelerates, the erosion of tidal flats may also accelerate, thus potentially exacerbating shoreline erosion and adversely affecting the ecosystem and the sustainability of future wetland ecosystem restoration projects. An adequate supply of sediment is necessary to ensure resilience of the Bay ecosystem as sea level rise accelerates.
- m. Human actions, such as dredging, disposal, ecosystem restoration, and watershed management, can affect the distribution and amount of sediment available to sustain and restore wetlands. Research on Bay sediment transport processes is needed to understand the volume of sediment available to wetlands, including sediment imported to and exported from the Bay. Monitoring of these processes can inform management efforts to maintain an adequate supply of sediment for wetlands.
- n. Buffers are areas established adjacent to a habitat to reduce the adverse impacts of surrounding land use and activities. Buffers also minimize additional loss of habitat from shoreline erosion resulting from accelerated sea level rise and allow tidal habitats to move landward. Buffer areas may be important for achieving the regional goals for the types, amounts, and distribution of habitats in the Baylands Ecosystem Habitat Goals report or future updates to these targets.
- o. Plant and animal species not present in San Francisco Bay prior to European contact in the late 18<sup>th</sup> century, known as non-native species, which thrive and reproduce outside of their natural range have made vast ecological alterations to the Bay and have contributed to the serious reduction of native regulations of certain plants and animals through: (1) predation; (2) competition for food, habitat, and other necessities; (3) disturbance of habitat; (4) displacement; or (5) hybridization. Many non-native species enter the Bay from commercial ship ballast water that is discharged into the Bay. Approximately 170 species have invaded the Bay since 1850, and possibly an additional 115 species have been deliberately introduced. By 2001, over 1,200 acres of recently

restored tidal marshes have been invaded by introduced cordgrass species, such as salt meadow cordgrass, dense-flowered cordgrass, English cordgrass and smooth cordgrass. At present an average of one new non-native species establishes itself in the Bay every 14 weeks. Control or eradication is a critical step in reducing the harm associated with non-native species.

- ~~m-p.~~ Fill material, such as rock and sediments dredged from the Bay, can enhance or beneficially contribute to the restoration of tidal marsh and tidal flat habitat by: (1) raising areas diked from the Bay to an elevation that will help accelerate establishment of tidal marsh; and (2) establishing or recreating rare Bay habitat types.

#### **Policies**

4. Where ~~and whenever possible~~ feasible, former tidal marshes and tidal flats that have been diked from the Bay should be restored to tidal action in order to replace lost historic wetlands or should be managed to provide important Bay habitat functions, such as resting, foraging and breeding habitat for fish, other aquatic organisms and wildlife. As recommended in the Baylands Ecosystem Habitat Goals report, around 65,000 acres of areas diked from the Bay should be restored to tidal action to maintain a healthy Bay ecosystem on a regional scale. Regional ecosystem targets should be updated periodically to guide conservation, restoration, and management efforts that result in a Bay ecosystem resilient to climate change and sea level rise. Further, local government land use and tax policies should not lead to the conversion of these restorable lands to uses that would preclude or deter potential restoration. The public should make every effort to acquire these lands ~~from willing sellers~~ for the purpose of habitat restoration and wetland migration.
5. The Commission should support comprehensive Bay sediment research and monitoring to understand sediment processes necessary to sustain and restore wetlands. Monitoring methods should be updated periodically based on current scientific information.
- ~~5-6.~~ Any ecosystem tidal restoration project should include clear and specific long-term and short-term biological and physical goals, and success criteria, and a monitoring program to assess the sustainability of the project. Design and evaluation of the project should include an analysis of: (a) the effects of relative how the system's adaptive capacity can be enhanced so that it is resilient to sea level rise and climate change; (b) the impact of the project on the Bay's sediment budget; (c) localized sediment erosion and accretion; (d) the role of tidal flows; (e) potential invasive species introduction, spread, and their control; (f) rates of colonization by vegetation; (g) the expected use of the site by fish, other aquatic organisms and wildlife; ~~and~~ (h) an appropriate buffer, where feasible, between shoreline development and habitats to protect wildlife and provide space for marsh migration as sea level rises; and (i) site characterization. If success criteria are not met, appropriate ~~corrective~~ adaptive measures should be taken.

#### **Climate Change (Add New Section to Part IV)**

##### **Findings**

- a. Greenhouse gases naturally reside in the earth's atmosphere, absorb heat emitted from the earth's surface and radiate heat back to the surface causing the planet to warm. This natural process is called the "greenhouse effect." Human activities since industrialization have increased the emissions of greenhouse gases through the burning of fossil fuels. The accumulation of these gases in the atmosphere is causing the planet to warm at an accelerated rate.

- b. The future extent of global warming is uncertain. It will be driven largely by future greenhouse gas emissions levels, which will depend on how global development proceeds. The United Nations Intergovernmental Panel on Climate Change (IPCC) developed a series of global development scenarios and greenhouse gas emissions scenarios for each development scenario. These emissions scenarios have been used in global models to develop projections of future climate, including global surface temperature and precipitation changes.
- c. Global surface temperature increases are accelerating the rate of sea level rise worldwide through thermal expansion of ocean waters and melting of land-based ice (e.g., ice sheets and glaciers). Bay water level is likely to rise by a corresponding amount. In the last century, sea level in the Bay rose nearly eight inches. Current science-based projections of global sea level rise over the next century vary widely. Using the IPCC greenhouse gas emission scenarios, in 2010 the California Climate Action Team (CAT) developed sea level rise projections (relative to sea level in 2000) for the state that range from 10 to 17 inches by 2050, 17 to 32 inches by 2070, and 31 to 69 inches at the end of the century. The CAT has recognized that it may not be appropriate to set definitive sea level rise projections, and, based on a variety of factors, state agencies may use different sea level rise projections. Although the CAT values are generally recognized as the best science-based sea level rise projections for California, scientific uncertainty remains regarding the pace and amount of sea level rise. Moreover, melting of the Greenland and Antarctic ice sheet may not be reflected well in current sea level rise projections. As additional data are collected and analyzed, sea level rise projections will likely change over time. The National Academy of Sciences is in the process of developing a Sea Level Rise Assessment Report that will address the potential impacts of sea level rise on coastal areas throughout the United States, including California and the Bay Area.
- d. Climate change will alter key factors that contribute to shoreline flooding, including sea level and storm frequency and intensity. During a storm, low air pressure can cause storm surge (a rapid rise in water level) and increased wind and wave activity can cause wave run up, which will be higher as sea level rises. These storm events can be exacerbated by El Niño events, which generally result in persistent low air pressure, greater rainfall, high winds and higher sea level. The coincidence of intense winter storms, extreme high tides, and high runoff, in combination with higher sea level, will increase the frequency and duration of shoreline flooding long before areas are permanently inundated by sea level rise alone. Swimming in the Bay is a popular activity, especially at Bay beaches. Bay water quality can affect the health of Bay swimmers. State law requires local public health officers to test water quality at popular beaches during high use periods, and to notify the public and post closure signs when dangerous levels of bacteria are present.
- e. Shoreline areas currently vulnerable to a 100-year flood event may be subjected to inundation by high tides at mid-century. Much of the developed shoreline may require new or upgraded shoreline protection to reduce damage from flooding. Shoreline areas that have subsided are especially vulnerable to sea level rise and may require more extensive shoreline protection. The Commission, along with other agencies such as the National Oceanic and Atmospheric Administration, the Federal Emergency Management Agency, the United States Army Corps of Engineers, cities, counties, and flood control districts, is responsible for protecting the public and the Bay ecosystem from flood hazards. This can be best achieved by using a range of scientifically based scenarios, including projections, which correspond to higher rates of sea level rise. In

planning and designing projects for the Bay shoreline, it is prudent to rely on the most current science-based and regionally specific projections of future sea level rise, develop strategies and policies that can accommodate sea level rise over a specific planning horizon (i.e., adaptive management strategies), and thoroughly analyze new development to determine whether it can be adapted to sea level rise.

- f. Natural systems and human communities are considered to be resilient when they can absorb and rebound from the impacts of weather extremes or climate change and continue functioning without substantial outside assistance. Systems that are currently under stress often have lower adaptive capacity and may be more vulnerable or susceptible to harm from climate change impacts. Human communities with adaptive capacity can adjust to climate change impacts by taking actions to reduce the potential damages, taking advantage of new opportunities arising from climate change, and accommodating the impacts. Understanding vulnerabilities to climate change is essential for assessing climate change risks to a project, the Bay or the shoreline. Risk is a function of the likelihood of an impact occurring and the consequence of that impact. Climate change risk assessments identify and prioritize issues that can be addressed by adaptation strategies.
- g. In the context of climate change, mitigation refers to actions taken to reduce greenhouse gas emissions, and adaptation refers to actions taken to address potential or experienced impacts of climate change that reduce risks. Adaptation actions that protect existing development and infrastructure can include protecting shorelines, promoting appropriate infill development, and designing new construction to be resilient to sea level rise. Another option is relocating structures out of flood and inundation zones. Some actions can integrate adaptation, mitigation, and flood protection strategies and may be cost-effective when implemented before sea level rises. For example restoring tidal marshes sequesters carbon, provides flood protection and provides habitat, and may protect lives, property and ecosystems. Identifying appropriate adaptation strategies requires complex policy considerations. Implementing many adaptation strategies will require action and funding by federal, state, regional and local agencies with planning, funding and land use decision-making authority beyond the Commission's jurisdiction.
- h. In the context of sea level rise adaptation, it is likely that myriad innovative approaches will emerge, likely including financing mechanisms to spread equitably the costs of protection from sea level rise, design concepts and land management practices. Effective, innovative adaptation approaches minimize public safety risks and impacts to critical infrastructure; maximize compatibility with and integration of natural processes; are resilient over a range of sea levels, potential flooding impacts and storm intensities; and are adaptively managed. Developing innovative adaptation approaches will require financial resources, testing and refinement to ensure that they effectively protect the Bay ecosystem and public safety before they are implemented on a large scale. Developing the right mix of approaches would best be accomplished through a comprehensive regional adaptation strategy developed through a process involving various stakeholders and local, regional, state and federal agencies.
- i. Adaptive management is a cyclic, learning-oriented approach that is especially useful for complex environmental systems characterized by high levels of uncertainty about system processes and the potential for different ecological, social and economic impacts from alternative management options. Effective adaptive management requires setting clear and measurable objectives, collecting data, reviewing current scientific observations, monitoring the results of policy implementation or management actions, and integrating this information into future actions.

- j. The principle of sustainability embodies values of equity, environmental and public health protection, economic vitality and safety. The goal of sustainability is to conduct human endeavors in a manner that will avoid depleting natural resources for future generations and producing no more than can be assimilated through natural processes, while providing for improvement of the human condition for all the people of the world. Efforts to improve the sustainability of natural systems and human communities can improve their resilience to climate change by increasing their adaptive capacity.
- k. Shoreline development and infrastructure, critical to public and environmental health and the region's economic prosperity, may be, or may become, vulnerable to flooding from sea level rise and storm activity. Public safety may be compromised and personal property and agricultural land may be damaged or lost during floods. Important public shoreline infrastructure and facilities, such as airports, ports, regional transportation facilities, landfills, contaminated lands and wastewater treatment facilities are at risk of flood damage that could require costly repairs, or result in the interruption or loss of vital services or degraded water quality. A current lack of funding to address projected impacts from sea level rise necessitates a collaborative approach with all stakeholder groups to find strategic and innovative solutions to advance the Bay Area's ability to meet environmental, public health, equity and economic goals.
- l. Waterfront parks, beaches, public access sites, and the Bay Trail are particularly vulnerable to flooding from sea level rise and storm activity because they are located immediately adjacent to the Bay. Flooding of, or damage to these areas would adversely affect the region's quality of life, if important public spaces and recreational opportunities are lost.
- m. The Bay ecosystem contains diverse and unique plants and animals and provides many benefits to humans. For example, tidal wetlands improve water quality, sequester carbon and can provide flood protection. Tidal high marsh and adjacent ecotones are essential to many tidal marsh species including endangered species. Agricultural lands along the Bay shoreline function as buffers that can reduce the adverse impacts of nearby land uses and activities on the Bay and tidal marshes and can also provide habitat for terrestrial species. The Bay ecosystem is already stressed by human activities that lower its adaptive capacity, such as diversion of freshwater inflow and loss of tidal wetlands. Climate change will further alter the ecosystem by inundating or eroding wetlands and ecotones, changing sediment dynamics, altering species composition, raising the acidity of Bay waters, changing freshwater inflow or salinity, altering the food web, and impairing water quality, all of which may impair the system's ability to rebound and function. Moreover, further loss of tidal wetlands will increase the risk of shoreline flooding.
- n. Some Bay Area communities, particularly those whose residents have low incomes, disabilities or are elderly, may lack the resources or capacity to respond effectively to the impacts of sea level rise and storm activity. Financial and other assistance is needed to achieve regional equity goals and help everyone be part of resilient shoreline communities.
- o. Approaches for ensuring public safety in developed vulnerable shoreline areas through adaptive management strategies include but are not limited to: (1) protecting existing and planned appropriate infill development; (2) accommodating flooding by building or renovating structures or infrastructure systems that are resilient or adaptable over time; (3) discouraging permanent new development when adaptive management strategies cannot protect public safety; (4) allowing only new uses that can be removed or phased out if adaptive management strategies are not available as inundation threats increase; and (5) over time and where feasible and appropriate, removing existing development

where public safety cannot otherwise be ensured. Determining the appropriate approach and financing structure requires the weighing of various policies and is best done through a collaborative approach that directly involves the affected communities and other governmental agencies with authority or jurisdiction. Some adaptive management strategies may require action and financing on the regional or sub-regional level across jurisdictions.

- p. The Association of Bay Area Governments and the Metropolitan Transportation Commission initiated the FOCUS program to develop a regional strategy that promotes a more compact Bay Area land use pattern. In consultation with local governments, the FOCUS program has identified Priority Development Areas for infill development in the Bay Area. These Priority Development Areas, along with other sites, are anticipated to be key components of the Bay Area's Sustainable Communities Strategy that will be adopted and periodically updated pursuant to SB 375. One of the Commission's objectives in adopting climate change policies is to facilitate implementation of the Sustainable Communities Strategy. Some shoreline areas that are vulnerable to flooding are already improved with public infrastructure and private development that has regionally significant economic, cultural or social value, and can accommodate infill development.
- q. When planning or regulating development within areas vulnerable to flooding from sea level rise, allowing small projects, such as minor repairs of existing facilities, and interim uses may be acceptable if they do not significantly increase overall risks to public safety.
- r. In some cases, the regional goals of encouraging infill development, remediating environmentally degraded land, redeveloping closed military bases and concentrating housing and job density near transit may conflict with the goal of minimizing flood risk by avoiding development in low-lying areas vulnerable to flooding. Methods to minimize this conflict, include, but are not limited to: clustering infill or redevelopment in low-lying areas on a portion of the property to reduce the area that must be protected; formulating an adaptation strategy for dealing with rising sea level and shoreline flooding with definitive goals and an adaptive management plan for addressing key uncertainties for the life of the project; incorporating measures that will enhance project resilience and sustainability; and developing a project-based financial strategy and/or a public financing strategy, as appropriate, to fund future flood protection for the project, which may also protect existing nearby development. Reconciling these different worthy goals and taking appropriate action requires weighing competing policy considerations and would be best accomplished through a collaborative process involving diverse stakeholders, similar to that being undertaken by the Joint Policy Committee to develop the Sustainable Communities Strategy.
- s. Some undeveloped low-lying areas that are vulnerable to shoreline flooding contain important habitat or provide opportunities for habitat enhancement. In these areas, development that would have regional benefits could preclude wetland enhancement that would also have regional benefits. Some developed areas may be suitable for ecosystem restoration, if existing development is removed to allow the Bay to migrate inland, although relocating communities is very costly and may result in the displacement of neighborhoods.

- t. There are multiple local, state, federal, and regional government agencies with authority over the Bay and shoreline. Local governments have broad authority over shoreline land use, but limited resources to address climate change adaptation. Working collaboratively with local governments, including agencies with responsibility for flood protection is desirable to optimize scarce resources and create the flexibility needed to plan amidst a high degree of uncertainty.
- u. Government jurisdictional boundaries and authorities in the Bay Area are incongruent with the regional scale and nature of climate-related challenges. The Joint Policy Committee, which is comprised of regional agencies, provides a framework for regional decision-making to address climate change through consistent and effective regionwide policy and to provide local governments with assistance and incentives for addressing climate change. The Commission can collaborate with the Joint Policy Committee to assure that the Bay Plan Climate Change policies are integrated with the emerging Sustainable Communities Strategy and other regional agencies' policies that deal with climate change issues.
- v. The Commission's legal authority and regulatory jurisdiction were created to address the Legislative findings and advance the declarations of state policy established in the McAteer-Petris Act and the Suisun Marsh Preservation Act of 1977. Climate change and sea level rise were not considerations when this authority and jurisdiction were established.
- w. The California Ocean Protection Council has endorsed the guiding principles of the California Climate Adaptation Strategy, which recommends that state agencies pursue the following policy objectives in their adaptation planning:
- Protect public health and safety and critical infrastructure;
  - Protect, restore, and enhance ocean and coastal ecosystems, on which the State economy and well-being depend;
  - Ensure public access to coastal areas and protect beaches, natural shoreline, and park and recreational resources;
  - Plan and Design new development and communities-for long-term sustainability in the face of climate change;
  - Facilitate adaptation of existing development and communities to reduce their vulnerability to climate change impacts over time; and
  - Begin now to adapt to the impacts of climate change.

The California Climate Adaptation Strategy recognizes that significant and valuable development has been built along the California coast for over a century. Some of the development is currently threatened by sea level rise or will be threatened in the near future. Similarly, the coastal zone is home to many threatened or endangered species and sensitive habitats. The strategy acknowledges that the high financial, ecological, social and cultural costs of protecting everything may prove to be impossible; in the long run, protection of everything may be both futile and environmentally destructive. The strategy recommends that decision guidance strategies frame cost-benefit analyses so that all public and private costs and benefits are appropriately considered.

The strategy further recommends that state agencies should generally not plan, develop, or build any new significant structure in a place where that structure will require significant protection from sea-level rise, storm surges, or coastal erosion during the expected life of the structure. However, the strategy also acknowledges that vulnerable shoreline areas containing existing development or proposed for new development that has or will have regionally significant economic, cultural, or social value may have to be protected, and infill development in these areas should be closely scrutinized and may be accommodated. The strategy recommends that state agencies should incorporate this policy into their decisions. If agencies plan, permit, develop or build any new structures in hazard zones, the California Climate Adaptation Strategy recommends that agencies employ or encourage innovative engineering and design solutions so that the structures are resilient to potential flood or erosion events, or can be easily relocated or removed to allow for progressive adaptation to sea level rise, flood and erosion.

The strategy further recommends that the state should consider prohibiting projects that would place development in undeveloped areas already containing critical habitat, and those containing opportunities for tidal wetland restoration, habitat migration, or buffer zones. The strategy also encourages projects that protect critical habitats, fish, wildlife and other aquatic organisms and connections between coastal habitats. The strategy recommends pursuing activities that can increase natural resiliency, such as restoring tidal wetlands, living shorelines, and related habitats; managing sediment for marsh accretion and natural flood protection; and maintaining upland buffer areas around tidal wetlands.

#### **Policies**

1. The Commission intends that the Bay Plan Climate Change findings and policies will be used as follows:
  - a. The findings and policies apply only to projects and activities located within the following areas: San Francisco Bay, the 100-foot shoreline band, salt ponds, managed wetlands, and certain waterways, as these areas are described in Government Code section 66610, and the Suisun Marsh, as this area is described in Public Resources Code section 29101;
  - b. For projects or activities that are located partly within the areas described in subparagraph a and partly outside such area, the findings and policies apply only to those activities or that portion of the project within the areas described in subparagraph a;
  - c. For the purposes of implementing the federal Coastal Zone Management Act, the findings and policies do not apply to projects and activities located outside the areas described in subparagraph a, even if those projects or activities may otherwise be subject to consistency review pursuant to the federal Coastal Zone Management Act; and
  - d. For purposes of implementing the California Environmental Quality Act, the findings and policies are not applicable portions of the Bay Plan for purposes of CEQA Guideline 15125(d) for projects and activities outside the areas described in subparagraph a and, therefore, a discussion of whether such proposed projects or activities are consistent with the policies is not required in environmental documents.

2. When planning shoreline areas or designing larger shoreline projects, a risk assessment should be prepared by a qualified engineer and should be based on the estimated 100-year flood elevation that takes into account the best estimates of future sea level rise and current flood protection and planned flood protection that will be funded and constructed when needed to provide protection for the proposed project or shoreline area. A range of sea level rise projections for mid-century and end of century based on the best scientific data available should be used in the risk assessment. Inundation maps used for the risk assessment should be prepared under the direction of a qualified engineer. The risk assessment should identify all types of potential flooding, degrees of uncertainty, consequences of defense failure, and risks to existing habitat from proposed flood protection devices.
3. To protect public safety and ecosystem services, within areas that a risk assessment determines are vulnerable to future shoreline flooding that threatens public safety, all projects—other than repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas—should be designed to be resilient to a mid-century sea level rise projection. If it is likely the project will remain in place longer than mid-century, an adaptive management plan should be developed to address the long-term impacts that will arise based on a risk assessment using the best available science-based projection for sea level rise at the end of the century.
4. To address the regional adverse impacts of climate change, undeveloped areas that are both vulnerable to future flooding and currently sustain significant habitats or species, or possess conditions that make the areas especially suitable for ecosystem enhancement should be given special consideration for preservation and habitat enhancement and should be encouraged to be used for those purposes.
5. Wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged.
6. The Commission, in collaboration with the Joint Policy Committee, other regional, state and federal agencies, local governments, and the general public, should formulate a regional sea level rise adaptation strategy for protecting critical developed shoreline areas and natural ecosystems, enhancing the resilience of Bay and shoreline systems and increasing their adaptive capacity.

The Commission recommends that: (1) the strategy incorporate an adaptive management approach; (2) the strategy be consistent with the goals of SB 375 and the principles of the California Climate Adaptation Strategy; (3) the strategy be updated regularly to reflect changing conditions and scientific information and include maps of shoreline areas that are vulnerable to flooding based on projections of future sea level rise and shoreline flooding; (4) the maps be prepared under the direction of a qualified engineer and regularly updated in consultation with government agencies with authority over flood protection; and (5) particular attention be given to identifying and encouraging the development of long-term regional flood protection strategies that may be beyond the fiscal resources of individual local agencies.

Ideally, the regional strategy will determine where and how existing development should be protected and infill development encouraged, where new development should be permitted, and where existing development should eventually be removed to allow the Bay to migrate inland.

The entities that formulate the regional strategy are encouraged to consider the following strategies and goals:

- a. advance regional public safety and economic prosperity by protecting: (i) existing development that provides regionally significant benefits; (ii) new shoreline development that is consistent with other Bay Plan policies; and (iii) infrastructure that is crucial to public health or the region's economy, such as airports, ports, regional transportation, wastewater treatment facilities, major parks, recreational areas and trails;
- b. enhance the Bay ecosystem by identifying areas where tidal wetlands and tidal flats can migrate landward; assuring adequate volumes of sediment for marsh accretion; identifying conservation areas that should be considered for acquisition, preservation or enhancement; developing and planning for flood protection; and maintaining sufficient transitional habitat and upland buffer areas around tidal wetlands;
- c. integrate the protection of existing and future shoreline development with the enhancement of the Bay ecosystem, such as by using feasible shoreline protection measures that incorporate natural Bay habitat for flood control and erosion prevention;
- d. encourage innovative approaches to sea level rise adaptation;
- e. identify a framework for integrating the adaptation responses of multiple government agencies;
- f. integrate regional mitigation measures designed to reduce greenhouse gas emissions with regional adaptation measures designed to address the unavoidable impacts of climate change;
- g. address environmental justice and social equity issues;
- h. integrate hazard mitigation and emergency preparedness planning with adaptation planning by developing techniques for reducing contamination releases, structural damage and toxic mold growth associated with flooding of buildings, and establishing emergency assistance centers in neighborhoods at risk from flooding;
- i. advance regional sustainability, encourage infill development and job creation, provide diverse housing served by transit and protect historical and cultural resources;
- j. encourage the remediation of shoreline areas with existing environmental degradation and contamination in order to reduce risks to the Bay's water quality in the event of flooding;
- k. support research that provides information useful for planning and policy development on the impacts of climate change on the Bay, particularly those related to shoreline flooding;
- l. identify actions to prepare and implement the strategy, including any needed changes in law; and

- m. identify mechanisms to provide information, tools, and financial resources so local governments can integrate regional climate change adaptation planning into local community design processes.
7. Until a regional sea level rise adaptation strategy can be completed, the Commission should evaluate each project proposed in vulnerable areas on a case-by-case basis to determine the project's public benefits, resilience to flooding, and capacity to adapt to climate change impacts. The following specific types of projects have regional benefits, advance regional goals, and should be encouraged, if their regional benefits and their advancement of regional goals outweigh the risk from flooding:
- a. remediation of existing environmental degradation or contamination, particularly on a closed military base;
  - b. a transportation facility, public utility or other critical infrastructure that is necessary for existing development or to serve planned development;
  - c. a project that will concentrate employment or housing near existing or committed transit service (whether by public or private funds or as part of a project), particularly within those Priority Development Areas that are established by the Association of Bay Area Governments and endorsed by the Commission, and that includes a financial strategy for flood protection that will minimize the burdens on the public and a sea level rise adaptation strategy that will adequately provide for the resilience and sustainability of the project over its designed lifespan; and
  - d. a natural resource restoration or environmental enhancement project.
- The following specific types of projects should be encouraged if they do not negatively impact the Bay and do not increase risks to public safety:
- e. repairs of an existing facility;
  - f. a small project;
  - g. a use that is interim in nature and either can be easily removed or relocated to higher ground or can be amortized within a period before removal or relocation of the proposed use would be necessary; and
  - h. a public park.
8. To effectively address sea level rise and flooding, if more than one government agency has authority or jurisdiction over a particular issue or area, project reviews should be coordinated to resolve conflicting guidelines, standards or conditions.

#### **Safety of Fills**

#### **Findings**

- f. Flood damage to fills and shoreline areas can result from a combination of sea level rise, storm surge, heavy rainfall, high tides, and winds blowing onshore. The most effective way to prevent such damage, is to locate projects and facilities structures on fill or near the shoreline should be above the a highest expected water level 100-year flood level that takes future sea level rise into account, during the expected life of the project, or should be protected for the expected life of the project by Other effective approaches that can reduce flood damage include protecting structures or areas with levees, of an adequate height seawalls, tidal marshes, or other protective measures; and employing innovative design concepts, such as building structures that can be easily relocated, tolerate periodic flooding or are adaptively designed and managed to address sea level rise over time.

- g. ~~Bay water levels are likely to increase in the future because of a relative rise in sea level. Relative rise in sea level is the sum of: (1) a rise in global sea level and (2) land elevation change (lifting or subsidence) around the Bay. If historic trends continue, global sea level should increase between four and five inches in the Bay in the next 50 years and could increase approximately one and one-half to five feet by the year 2100 depending on the rate of accelerated rise in sea level caused by the "greenhouse effect," the long-term warming of the earth's surface from heat radiated off the earth and trapped in the earth's atmosphere by gases released into the atmosphere. The warming would bring about an accelerated rise in sea level worldwide through thermal expansion of the upper layers of the oceans and melting of some of the earth's glaciers and polar ice packs. Sea level is rising at an accelerated rate due to global climate change. Land elevation change caused by tectonic (geologic, including seismic) activity, consolidation or compaction of soft soils such as Bay muds, and extraction of subsurface groundwater or natural gas extraction, is variable around the Bay. Consequently, some parts of the Bay will experience a greater relative rise in sea level than other areas. Relative rise in sea level is the sum of: (1) a rise in global sea level and (2) land elevation change (lifting or subsidence) around the Bay. For example, in Sausalito, the land area has been gradually lifting while in the South Bay excessive pumping from underground fresh water reservoirs has caused extensive subsidence of the ground surface in the San Jose area and as far north as Dumbarton Bridge (map of Generalized Subsidence and Fault Zones shows subsidence from 1934 to 1967). Indications are that if heavy groundwater pumping is continued indefinitely in the South Bay area, land in the Alviso area (which has already subsided about seven feet since 1912) could subside up to seven feet more; if this Where subsidence occurs, more extensive levees shoreline protection and wetland restoration projects may be needed to minimize prevent inundation flooding of low-lying areas by the extreme high water levels.~~

#### **Policies**

3. To provide vitally-needed information on the effects of earthquakes on all kinds of soils, installation of strong-motion seismographs should be required on all future major land fills. In addition, the Commission encourages installation of strong-motion seismographs in other developments on problem soils, and in other areas recommended by the U.S. Coast and Geodetic Geological Survey, for purposes of data comparison and evaluation.
4. ~~Adequate measures should be provided To prevent damage from sea level rise and storm activity flooding, that may occur structures on fill or near the shoreline over the expected life of a project. should have adequate flood protection including consideration of future relative sea level rise as determined by competent engineers. As a general rule, The Commission may approve fill that is needed to provide flood protection for existing projects and uses. New projects structures on fill or near the shoreline should either be above the wave runup level or sufficiently set back from the edge of the shore so that the project structure is will not be subject to dynamic wave energy, be built so In all cases, the bottom floor level of structures should will be above a the highest estimated tide 100-year flood elevation that takes future sea level rise into account for the expected life of the project, be Exceptions to the general height rule may be made for developments specifically designed to tolerate periodic flooding, or employ other effective means of addressing the impacts of future sea level rise and storm activity. Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.~~

5. ~~To minimize the potential hazard to Bay fill projects and bayside development from subsidence, all proposed developments should be sufficiently high above the highest estimated tide level for the expected life of the project or sufficiently protected by levees to allow for the effects of additional subsidence for the expected life of the project, utilizing the latest information available from the U.S. Geological Survey and the National Ocean Service. Rights-of-way for levees protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.~~
6. ~~Local governments and special districts with responsibilities for flood protection should assure that their requirements and criteria reflect future relative sea level rise and should assure that new structures and uses attracting people are not approved in flood-prone areas or in areas that will become flood-prone in the future, and that structures and uses that are approvable will be built at stable elevations to assure long-term protection from flood hazards.~~

### **Protection of the Shoreline Protection**

#### **Findings**

- a. Well designed shoreline protection projects, such as levees, wetlands, or riprap, can prevent shoreline erosion and damage from flooding.
- ~~a.b. Erosion control~~ Because vast shoreline areas are vulnerable to flooding and because much of the shoreline consists of soft, easily eroded soils, shoreline protection projects are often needed to protect reduce damage to shoreline property and improvements. from erosion. Because so much shoreline consists of soft, easily eroded soils, protective structures are usually required to stabilize and establish a permanent shoreline. These structures Structural shoreline protection, such as riprap, levees, and seawalls, often requires periodic maintenance and reconstruction.
- ~~b.c. Most erosion control structural shoreline protection projects involve some fill, which can adversely affect natural resources, such as water surface area and volume, tidal circulation, and wildlife use. marshes, and mudflats. Structural shoreline protection can further cause erosion of tidal wetlands and tidal flats, prevent wetland migration to accommodate sea level rise, create a barrier to physical and visual public access to the Bay, create a false sense of security and may have cumulative impacts. Physical and visual public access can be provided on levees and other protection structures. As the rate of sea level rise accelerates and the potential for shoreline flooding increases, the demand for new shoreline protection projects will likely increase. Some projects may involve extensive amounts of fill.~~
- ~~e.d. Structural S~~ Shoreline protection structures, such as riprap and sea walls, are is most effective and less damaging to natural resources if they are it is the appropriate kind of structure for the project site and erosion and flood problem, and are is properly designed, constructed, and maintained. Because factors affecting erosion and flooding vary considerably, no single protective method or structure is appropriate in all situations. When a structure is not appropriate or is improperly designed and constructed to meet the unique site characteristics, flood conditions of, and erosion forces at a project site, the structure is more likely to fail, require additional fill to repair, have higher long-term maintenance costs because of higher frequency of repair, and cause greater disturbance and displacement of the site's natural resources.

- e. Addressing the impacts of sea level rise and shoreline flooding may require large-scale flood protection projects, including some that extend across jurisdictional or property boundaries. Coordination with adjacent property owners or jurisdictions to create contiguous, effective shoreline protection is critical when planning and constructing flood protection projects. Failure to coordinate may result in inadequate shoreline protection (e.g., a protection system with gaps or one that causes accelerated erosion in adjacent areas).
- ~~df.~~ Nonstructural ~~erosion control~~ shoreline protection methods, such as tidal marshes ~~marsh plantings~~, can provide effective flood control, but are typically effective for erosion control only in areas experiencing mild erosion. ~~However,~~ In some instances, it may be possible to combine marsh habitat restoration, enhancement or protection with structural approaches to provide protection from flooding and control shoreline erosion, thereby minimizing the erosion control shoreline protection project's impact on natural resources.
- e.g. Loose dirt, concrete slabs, asphalt, bricks, scrap wood and other kinds of debris, are generally ineffective in halting shoreline erosion or preventing flooding and may lead to increased fill or release of pollutants. Although providing some short-term shoreline protection, protective structures constructed of such debris materials typically fail rapidly in storm conditions because the material slides bayward or is washed offshore. Repairing these ineffective structures requires additional material to be placed along the shoreline, leading to unnecessary fill and disturbance of natural resources.

#### **Policies**

1. New shoreline ~~erosion control~~ protection projects and the maintenance or reconstruction of existing ~~erosion control facilities~~ projects and uses should be authorized if: (a) the project is necessary to ~~protect the shoreline from~~ provide flood or erosion protection for (i) existing development, use or infrastructure, or (ii) proposed development, use or infrastructure that is consistent with other Bay Plan policies; (b) the type of the protective structure is appropriate for the project site, the uses to be protected, and the erosion and flooding conditions at the site; ~~and~~ (c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account; (d) the project is properly designed and constructed to prevent significant impediments to physical and visual public access; and (e) the protection is integrated with current or planned adjacent shoreline protection measures. Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design of ~~erosion control~~ projects.
2. Riprap revetments, the most common shoreline protective structure, should be constructed of properly sized and placed material that meet sound engineering criteria for durability, density, and porosity. Armor materials used in the revetment should be placed according to accepted engineering practice, and be free of extraneous material, such as debris and reinforcing steel. Generally, only engineered quarrystone or concrete pieces that have either been specially cast, are free of extraneous materials from demolition debris, ~~or~~ and are carefully selected for size, density, and durability, ~~and freedom of extraneous materials from demolition debris~~ will meet these requirements. Riprap revetments constructed out of other debris materials should not be authorized.

3. Authorized protective projects should be regularly maintained according to a long-term maintenance program to assure that the shoreline will be protected from tidal erosion and flooding and that the effects of the ~~erosion control~~ shoreline protection project on natural resources during the life of the project will be the minimum necessary.
4. Whenever feasible and appropriate, shoreline protective ~~on~~ projects should include provisions for nonstructural methods such as marsh vegetation ~~where feasible and~~ integrate shoreline protection and Bay ecosystem enhancement, using adaptive management. Along shorelines that support marsh vegetation, or where marsh establishment has a reasonable chance of success, the Commission should require that the design of authorized protective ~~on~~ projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever ~~practicable~~ feasible.
5. Adverse impacts to natural resources and public access from new shoreline protection should be avoided. Where significant impacts cannot be avoided, mitigation or alternative public access should be provided.

#### **Public Access**

#### **Findings**

- f. Accelerated flooding from sea level rise and storm activity will severely impact existing shoreline public access, resulting in temporary or permanent closures. Periodic and consistent flooding would increase damage to public access areas, which can then require additional fill to repair, raise maintenance costs, and cause greater disturbance and displacement of the site's natural resources. Risks to public health and safety from sea level rise and shoreline flooding may require new shoreline protection to be installed or existing shoreline protection to be modified, which may impede physical and visual access to the Bay.

#### **Re-letter findings f. and g. to g. and h. respectively.**

- h*j*. Public access areas obtained through the permit process are most utilized if they provide physical access, provide connections to public rights-of-way, are related to adjacent uses, are designed, improved and maintained clearly to indicate their public character, and provide visual access to the Bay. Flooding from sea level rise and storm activity increases the difficulty of designing public access areas (e.g., connecting new public access that is set at a higher elevation or located farther inland than existing public access areas).

#### **Re-letter findings i. and j. to j. and k. respectively.**

- k*l*. Studies indicate that public access may have immediate effects on wildlife (including flushing, increased stress, interrupted foraging, or nest abandonment) and may result in adverse long- term population and species effects. Although some wildlife may adapt to human presence, not all species or individuals may adapt equally, and adaptation may leave some wildlife more vulnerable to harmful human interactions such as harassment or poaching. The type and severity of effects, if any, on wildlife depend on many factors, including physical site configuration, species present, and the nature of the human activity. Accurate characterization of current and future site, habitat and wildlife conditions, and of likely human activities, would provide information critical to understanding potential effects on wildlife.

- lm. Potential adverse effects on wildlife from public access may be avoided or minimized by siting, designing and managing public access to reduce or prevent adverse human and wildlife interactions. Managing human use of the area may include adequately maintaining improvements, periodic closure of access areas, pet restrictions such as leash requirements, and prohibition of public access in areas where other strategies are insufficient to avoid adverse effects. Properly sited and/or designed public access can avoid habitat fragmentation and limit predator access routes to wildlife areas. In some cases, public access adjacent to sensitive wildlife areas may be set back from the shoreline a greater distance because buffers may be needed to avoid or minimize human disturbance of wildlife. Appropriate siting, design and management strategies depend on the environmental characteristics of the site, ~~and~~ the likely human uses of the site, and the potential impacts of future climate change.
- mn. Providing diverse and satisfying public access opportunities can reduce the creation of informal access routes to decrease interaction between humans and wildlife, habitat fragmentation, and vegetation trampling and erosion. Formal public access also provides for more predictable human actions, which may increase the ability of wildlife to adjust to human use.

#### **Policies**

5. Public access should be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding.
56. Whenever public access to the Bay is provided as a condition of development, on fill or on the shoreline, the access should be permanently guaranteed. This should be done wherever appropriate by requiring dedication of fee title or easements at no cost to the public, in the same manner that streets, park sites, and school sites are dedicated to the public as part of the subdivision process in cities and counties. Any public access provided as a condition of development should either be required to remain viable in the event of future sea level rise or flooding, or equivalent access consistent with the project should be provided nearby.
67. Public access improvements provided as a condition of any approval should be consistent with the project and the physical environment, including protection of Bay natural resources, such as aquatic life, wildlife and plant communities, and provide for the public's safety and convenience. The improvements should be designed and built to encourage diverse Bay-related activities and movement to and along the shoreline, should permit barrier free access for persons with disabilities ~~the physically handicapped~~ to the maximum feasible extent, should include an ongoing maintenance program, and should be identified with appropriate signs.

**Renumber Public Access Policies 7 through 13 to 8 through 14.**

We certify that this resolution was adopted by a vote of \_\_\_\_\_ "yes" votes, \_\_\_\_\_ "no" votes and \_\_\_\_\_ abstentions at the Commission meeting held October 6, 2011 at San Francisco, California.

Executed on this \_\_\_\_\_ day of \_\_\_\_\_, 2011 at San Francisco, California.

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R. SEAN RANDOLPH  
Chairman

Executed on this \_\_\_\_\_ day of \_\_\_\_\_, 2011 at San Francisco, California

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WILL TRAVIS  
Executive Director