

San Francisco Bay Conservation and Development Commission

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TO: Commissioners and Alternates

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SUBJECT: Staff Report and Preliminary Recommendation for Proposed Bay Plan Amendment No. 1-17 Concerning the Update of the Bay Plan Fill for Habitat Policies
(For Commission Consideration on June 20, 2019)

Preliminary Staff Recommendation

The staff recommends that the Commission:

Amend the Bay Plan Fish, Other Aquatic Organisms, and Wildlife; Tidal Marshes and Tidal Flats; Subtidal Areas; Dredging; and Shoreline Protection findings and policies, as well as the Major Conclusions and Policies, as identified in the Proposed Changes to Existing Bay Plan Findings and Policies section of this report.

Background

Sea level rise has long been recognized as an issue in the San Francisco Bay. The San Francisco Bay Conservation and Development Commission (BCDC) was early to recognize the potential challenges posed by sea level rise, and in response prepared a report entitled *Sea Level Rise: Predictions and Implications for San Francisco Bay* in 1987, and amended the findings and policies of the *San Francisco Bay Plan* (Bay Plan) to address this issue in 1989. In 2008, the Commission revisited the issue of sea level rise within the context of global climate change, which had gained global scientific consensus by that time. The Commission's most recent consideration of climate change resulted in the release of a background report entitled *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on the Shoreline* as part of a Bay Plan Amendment process that was completed in 2011. The Bay Plan Amendment resulted in the addition of a Climate Change section of the Bay Plan, as well as the addition of findings and policies throughout several other Bay Plan sections. BCDC's Climate Change policies recognize that sea level rise poses significant risks to both the built and natural environment of the San Francisco Bay region.

However, the climate change policies do not fully address the role of sediment and fill in sea level rise adaptation. Since the 2011 climate change update, the importance of sediment and other types of fill for sea level rise adaptation have been emphasized by several key scientific reports, including the *San Francisco Bay Subtidal Habitat Goals Report* (2010)¹, the *Baylands Ecosystem Habitat Goals*

¹ San Francisco Bay Subtidal Habitat Goals Project (2010) San Francisco Bay Subtidal Habitat Goals Report.

Update (2015)², and the *Adaptation Atlas* (2019)³. The need for Bay fill for restoration is now widely recognized by the restoration community—including practitioners, consultants, regulators, and scientists—throughout the Bay Area. The most recent scientific projections for sea level rise estimate that the San Francisco Bay waters could rise anywhere between 1.2 and 14.2 feet in the next century⁴, with the rate of sea level rise expected to accelerate after mid-century. As a result of this acceleration, Bay habitats will be at increased risk for damage and loss as a result of inundation and deepening waters. Existing and restored tidal marshes, mudflats, and transitional habitat are expected to experience more frequent inundation and in the absence of intervention, may eventually be submerged permanently. Deeper waters over subtidal habitats such as eelgrass beds could deprive them of the physical conditions that they need to thrive (e.g. lower light availability in deeper water could negatively impact eelgrass). Under the right conditions, Bay ecosystems are able to migrate naturally inland and upland. This requires adequate sediment supply and adequate space to migrate, both of which are limited for ecosystems in the Bay. To provide more sediment and restore ecosystem connectivity, habitat restoration, enhancement, or creation may require the use of more Bay fill. However, BCDC’s current policies may limit the use of fill for habitat projects, limiting the placement of fill necessary to sustain coastal ecosystems into the future.

In addition, due to the subsided nature of historic diked baylands that ring the Bay, significant amounts of sediment are needed to bring the baylands up to an elevation that would support vegetation. Established vegetation is a key requirement for restored tidal wetlands to keep up with rising sea level. It is also important for BCDC policies to help these projects move ahead on an expedited basis. In several cases, restoration projects have been opened to tidal action without raising the elevation to levels sufficient for vegetation colonization, relying solely on sediment settling on site through natural processes. Because this process is slow, vegetation colonization is predicted to take decades for these projects. There is some recognition now that with accelerating sea level rise, they may not reach appropriate elevations without additional sediment. Because these sites are already tidally active, it would be challenging under BCDC’s current policies for the Commission to authorize significant amounts of fill in these sites.

Recognizing the potential need for projects in the Bay to use more fill for sea level rise adaptation, the Commission created a Commissioner Working Group called the Bay Fill Policies Working Group (BFPWG). The BFPWG first met in 2015 with the charge of “making recommendations to the full Commission regarding whether BCDC’s law and policies regarding Bay fill need to be amended to adapt to rising sea level, and make the Bay region more resilient and environmentally and economically productive, while ensuring Bay protection and maximum feasible public access to the Bay”⁵. In order to provide these recommendations, the Working Group examined and discussed relevant parts of the McAteer-Petris Act and *San Francisco Bay Plan*, and hosted stakeholder presentations on relevant topics. The discussions were divided into two

² Goals Project. 2015. *The Baylands and Climate Change: What We Can Do*. Baylands Ecosystem Habitat Goals Science Update 2015 prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. California State Coastal Conservancy, Oakland, CA.

³ SFEI and SPUR. 2019. *San Francisco Bay Shoreline Adaptation Atlas: Working with Nature to Plan for Sea Level Rise Using Operational Landscape Units*. Publication #915, San Francisco Estuary Institute, Richmond, CA.

⁴ California Ocean Protection Council (2018) *State of California Sea-Level Rise Guidance: 2018 Update*

⁵ BCDC, May 13, 2016. *Summary of Bay Fill Working Group Activities and Considerations on Bay Fill Policies and Habitat Based Projects*.

sections—the first to address fill policies’ application to habitat projects, and the second to address fill policies specific to the built environment. Through the discussions, BCDC staff and the BFPWG identified challenges in policy language, interpretation, and application that could hinder adaptation to sea level rise for habitat projects, and noted that the Bay Plan contained language that could be problematic for future habitat adaptation. The BFPWG recognized that several Bay Plan policies do not allow more than a “minor” amount of fill and/or dredged sediment for habitat projects in tidal waters, and that these policies had already constrained the permitting of a few projects.

The primary example of this challenge was the Sonoma Creek Enhancement Project, for which project designers had proposed a relatively large volume of fill for the creation of an upland transition zone within an existing tidal marsh. The transition zone was intended to provide high tide refugia for wildlife and space for the marsh to migrate upslope as sea level rises. It was difficult for staff to reconcile the proposed volume of fill with the “minor amount of fill” policy language in the Bay Plan, so the project design was altered to a smaller volume and square footage of fill. The project was completed, but with less fill and a more steeply sloped transition zone⁶, which may limit the functional benefits provided by the transitional ectone. The Working Group recognized that similar situations could arise in the future if the minor fill language was not changed. Staff summarized these findings, among others, in a report titled *Summary of Bay Fill Working Group Activities and Considerations on Bay Fill Policies and Habitat Based Projects*⁷, which was presented to the BFPWG on May 13, 2016.

A concurrent planning process titled *Policies for a Rising Bay* (PRB) began in 2015 as well. The PRB’s charge was “to evaluate the Commission’s laws and policies in light of the novel threats to the Bay presented by sea level rise; and to determine if changes are needed to help facilitate the region to advance appropriate resilience and adaptation actions”⁸. The project was conducted by BCDC staff with a steering committee composed of over 30 stakeholders representing public, private, and non-governmental organizations. To complete the evaluation of BCDC’s laws and policies, BCDC staff, steering committee members, and other interested parties conducted a series of interviews, case studies, and working meetings. Through this process, four priority policy themes were identified, one of which was “Fill for Resilience and Adaptation—Habitat Restoration and Protection.” Under this theme, the “minor” amount of fill policy restrictions on habitat projects in the Bay were again identified as a potential challenge and area for a possible policy amendment.

In early 2016, as the BFPWG and PRB policy analysis processes were underway, the Commission began a series of public workshops on rising sea level. The first four workshops focused on a review of BCDC’s climate change policies and how they had been applied, BCDC’s role in regional planning, and the development of recommendations for regional adaptation actions that the Commission could lead or support. During the fourth workshop, eight recommendations were developed and adopted, one of which was to “Change existing laws, policies and regulations to more fully consider the local and regional impacts of rising sea levels in permitting and decision-making processes as needed.”⁹ The six workshops that followed focused on this action, and incorporated findings and

⁶ BCDC, November 26, 2014. Staff Recommendation for Consistency Determination No. C2014.004.00 for the U.S. Fish and Wildlife Service’s Sonoma Creek Enhancement Project.

⁷ BCDC, May 13, 2016. *Summary of Bay Fill Working Group Activities and Considerations on Bay Fill Policies and Habitat Based Projects*.

⁸ BCDC, November 1, 2016. *Policies for a Rising Bay Project Final Report*.

⁹ BCDC, September 16, 2016. *Memo on the Final Recommendations from the Commissioner Workshop Series on Rising Sea Levels*

recommendations from PRB and the BFPWG into the discussions about priority law, policy, and regulation changes. The issue of fill needed for habitat development, and the potential for BCDC's policies to restrict the necessary amounts of fill for habitat resilience in the future, was identified as a priority issue through the remaining workshops. On July 20, 2017, the Commission voted to initiate a Bay Plan Amendment to address fill in habitat projects, and the associated natural resources, dredging, and shoreline protection policies.

The driving impetus for the Fill for Habitat Bay Plan amendment is that fill may be necessary for sea level rise adaptation of Bay habitats, to address this potential need, and to address restoration project proponents' additional concerns regarding related policy issues. Staff identified, reviewed, and examined the policy challenges through several processes. BCDC staff engaged with technical experts and stakeholders by conducting a series of one-on-one interviews, and by attending and/or presenting at workshops, conferences, and coordination meetings. The stakeholder engagement process is summarized in Appendix A. BCDC planning, regulatory, and legal staff discussed associated issues through meetings and one-on-one interviews. Staff continued to meet monthly with the BFPWG, who provided essential guidance on the scope of the amendment and potential policy issues. Finally, staff held a series of Commission briefings to provide relevant scientific background for the amendment process. The briefings are summarized in Appendix B.

These processes guided staff in the development of six key policy issues to be addressed through the amendment: (1) the limited amount of fill allowed for habitat projects in the Bay; (2) the limited amount of dredged sediment allowed for habitat projects in the Bay; (3) the consideration of regional restoration goals and restoring complete, well-connected ecosystems; (4) how to address uncertainty in fill for habitat projects via monitoring, adaptive management, and pilot projects while encouraging demonstration projects to assess new approaches to sustain habitats in the face of a rising Bay; (5) consideration of the impacts and potential habitat type conversion caused by allowing more fill for habitat projects in the Bay; and (6) consideration of more robust policies on natural and nature-based shoreline protection solutions.

With input from the BFPWG, BCDC staff created posters associated with each of these policy issues and convened a Commissioner Workshop on March 21, 2019. Attendees at the Workshop included BCDC Commissioners, BCDC staff, interested stakeholders, and members of the public. Three discussion rounds were held in which participants circulated among posters and provided feedback on policy options to address each policy issue. A summary of the workshop and feedback provided can be found in Appendix C.

Feedback from the workshop, additional stakeholder interviews, and staff discussions informed the formulation of amended findings and policies. Background material for the proposed amendment is presented in the staff background report entitled *Bay Fill for Habitat Restoration, Enhancement, and Creation in a Changing Bay*. The [background report](#) provides the scientific foundation for the update of the Bay Plan findings and policies by providing an analysis of the topics listed above.

Proposed Changes to Existing Bay Plan Findings and Policies

The staff proposes that the Bay Plan be amended to incorporate the changes to the findings and policies shown below. Proposed additions in language are shown as underlined, while proposed language deletions are shown as struck through. An analysis of reasons for the proposed changes and the location of further information contained in the [background report](#), entitled *Bay Fill for Habitat Restoration, Enhancement, and Creation in a Changing Bay*, is also included.

Major Conclusions and Policies

The staff preliminarily recommends the Commission revise the findings and policies in the “Major Conclusions and Policies” section as shown in the draft language below.

Major Conclusions and Policies	
Draft Policy Changes	Staff Analysis
<p>4: Justifiable Filling. Some Bay filling may be justified for purposes providing substantial public benefits if these same benefits could not be achieved equally well without filling. Substantial public benefits are provided by:</p> <ul style="list-style-type: none"> a. Developing adequate port terminals, on a regional basis, to keep San Francisco Bay in the forefront of the world's great harbors during a period of rapid change in shipping technology. b. Developing adequate land for industries that require access to shipping channels for transportation of raw materials or manufactured products. c. Developing new recreational opportunities-shoreline parks, marinas, fishing piers, beaches, hiking and bicycling paths, and scenic drives. d. Developing expanded airport terminals and runways if regional studies demonstrate that there are no feasible sites for major airport development away from the Bay. e. Developing new freeway routes (with construction on pilings, not solid fill) if thorough study determines that no feasible alternatives are available. 	<p>The language in this policy reflects an outdated perspective that does not capture the substantial benefits provided by using fill for ecosystem restoration, enhancement, creation projects, or shoreline protection projects.</p>

Major Conclusions and Policies	
Draft Policy Changes	Staff Analysis
<p>f. Developing new public access to the Bay and enhancing shoreline appearance over and above that provided by other Bay Plan policies—through filling limited to Bay-related commercial recreation and public assembly.</p> <p>g. <u>Restoring, enhancing, or creating ecosystems that provide habitat for native fish, other aquatic organisms, or wildlife; enhance coastal resilience; and provide services such as water filtration and carbon sequestration. Fill for these purposes will be especially important to facilitate the adaptation of habitats to rising sea level.</u></p> <p>5: Effects of Bay Filling. Bay filling that is should be limited to <u>consistent with the purposes listed above can provide substantial benefits to the Bay.</u> However, because any filling is can be harmful to the Bay, and thus to present and future generations of Bay Area residents and thus there are some tradeoffs when fill is used. All Bay filling can have has <u>one or more of the following harmful effects:</u></p> <p>a. Filling <u>can negatively affect, and in some cases destroys,</u> the habitat of fish, and wildlife, <u>and other organisms.</u> Future filling can disrupt the ecological balance in the Bay, which has already been damaged by past fills, and can endanger the very existence of some species of birds and fish. The Bay, including open water, mudflats, and marshlands, is a complex biological system, in</p>	

Major Conclusions and Policies	
Draft Policy Changes	Staff Analysis
<p>which microorganisms, plants, fish, waterfowl, and shorebirds live in a delicate balance created by nature, and in which seemingly minor changes, such as a new fill or dredging project, may have far-reaching and sometimes highly destructive effects.</p> <p>b. Filling <u>almost</u> always increases the danger of water pollution by reducing the ability of the Bay to assimilate the increasing quantity of liquid wastes being that is <u>discharged</u> into it. Filling reduces both the surface area of the Bay and the volume of water in the Bay; this reduces the ability of the Bay to maintain adequate levels of oxygen in its waters, and also reduces the strength of the tides necessary to flush wastes from the Bay.</p> <p>c. Filling <u>can</u> reduces the air-conditioning effects of the Bay and increases the danger of air pollution in the Bay Area. Reducing the open water surface over which cool air can move in from the ocean will reduce the amount of this air reaching the Santa Clara Valley and the Carquinez Strait in the summer- and will increase the frequency and intensity of temperature-inversions, which trap air pollutants and thus cause an increase in smog in the Bay Area.</p> <p>d. Indiscriminate filling will diminish the scenic beauty of the Bay.</p>	<p>The language in this policy reflects an outdated perspective that does not capture today's context in light of climate change and rising seas. Although fill can be harmful, in some cases tradeoffs that may cause some harm are needed in order to create substantial net habitat benefits. Nonetheless, it is still important to recognize the potential impacts of fill, and to address these issues when assessing fill projects.</p>

Fish, Other Aquatic Organisms, and Wildlife. The staff preliminarily recommends the Commission revise the findings and policies in the “Fish, Other Aquatic Organisms, and Wildlife” policy section as shown in the draft language below.

Fish, Other Aquatic Organisms, and Wildlife	
Draft Findings Changes	Staff Analysis
<p>a. Over the past 200 years, human actions have had a major effect on the form and natural functions of San Francisco Bay, resulting in a significant decrease in the size of the open waters of the Bay—from about 516,000 acres to 327,000 acres, an approximately 40 percent reduction—and notable changes in populations <u>the types, locations, quality, and quantity of habitat</u> for of fish, other aquatic organisms (e.g., crabs, shrimp, zooplankton, and oysters, <u>plants and seaweed</u>) and wildlife habitat types, locations, quality and quantity. Loss or degradation of subtidal areas, tidal flats, tidal marshes and <u>adjacent interconnected</u> upland habitats, such as diked baylands, have been key factors in the population decline of many species of fish, other aquatic organisms and wildlife that depend on the Bay ecosystem for their existence.</p>	<p>Language of this finding was modified to clarify the impacts of human actions on Bay species and habitats.</p> <p>Plants and seaweed were added to the list of other aquatic organisms, as they are also Bay organisms in need of protection, thereby clarifying that the use of “other aquatic organisms” throughout the rest of the Bay Plan also includes plants and seaweed.</p>
<p>b. Conserving fish, other aquatic organisms and wildlife depends, among other things, upon availability of: (1) sufficient oxygen in the Bay waters; (2) adequate amounts of the proper foods; (3) sufficient areas for resting, foraging and breeding; and (4) proper fresh water inflows, temperature, salt content, water quality, <u>sediment concentration</u>, and velocity of the water. Requirements vary according to the species of fish, other aquatic organisms and wildlife. Conservation and restoration of these complete habitats components <u>these complete habitats</u> is essential to insure for future generations the benefit of fish, other aquatic organisms and wildlife in the Bay.</p>	<p>Proper suspended sediment concentration is important to the conservation of fish, other aquatic organisms, and wildlife, as discussed in Chapter 7 of the Background Report. Additionally, language is added to note that the components stated above comprise complete habitats. Complete habitats/ecosystems are discussed in more detail in Chapter 6 of the Background Report.</p>

Fish, Other Aquatic Organisms, and Wildlife	
Draft Findings Changes	Staff Analysis
<p>c. The wildlife refuges, <u>some of which are</u> shown on the Bay Plan Maps, include national wildlife refuges, state wildlife areas and ecological reserves, as well as other shoreline sites around the Bay whose primary purpose is: (1) the protection of threatened or endangered native plants, wildlife, and aquatic organisms; (2) the preservation and enhancement of unique habitat types or highly significant wildlife habitat; or (3) the propagation and feeding</p>	<p>The Bay Plan Maps do not actually include all of the wildlife refuges as defined in this policy. To clarify that the Bay Plan Maps are not comprehensive in depicting wildlife refuges, the phrase "some of which are" was added.</p>
<p>d. Under the California Endangered Species Act, the Commission must assure that the projects it permits conserve fish, other aquatic organisms, wildlife and plants listed pursuant to the Act and the Commission may not authorize the "taking," as defined in the Act, of certain fish, wildlife or plant species without the authorization of the California Department of Fish and <u>Wildlife Game</u>. Further, under the federal Endangered Species Act and Marine Mammal Protection Act the Commission may not authorize a project that would result in the "taking" of fish, other aquatic organisms and wildlife, including marine mammals, identified pursuant to the Acts, without the authorization of the United States Fish and Wildlife Service or the National Marine Fisheries Service.</p>	<p>The California Department of Fish and Game is now called the California Department of Fish and Wildlife.</p>
<p>e. Under the federal <u>Magnuson-Stevens Fisheries Conservation and Management Act</u> and the Endangered Species Act, San Francisco Bay is considered <u>essential fish habitat or critical habitat</u> for certain fish species, such as Chinook salmon and Delta smelt, by the <u>National Marine Fisheries Service and the United States Fish and Wildlife</u></p>	<p>Edits were made to improve the consistency of the sentence structure, and to include the complete name of the Magnuson-Stevens Act.</p>

Fish, Other Aquatic Organisms, and Wildlife	
Draft Findings Changes	Staff Analysis
<p>Service and the National Marine Fisheries Service because the Bay plays an essential role in their life cycles. The Magnuson-Stevens Act requires that the National Marine Fisheries Service provide conservation recommendations to <u>federal and</u> state agencies, such as the Commission, when a proposed project would have adverse impacts on essential fish habitat.</p>	
<p>i. The Baylands Ecosystem Habitat Goals provides a regional vision of the types, amounts, and distribution of baylands habitats that are needed to restore and sustain a healthy Bay ecosystem, including the improvement of the well-being of many plant and animal species currently at risk of extinction.</p>	<p>This finding was removed and replaced with a finding that addresses additional regional frameworks.</p>
<p><u>i. Regional frameworks, such as the 2015 Baylands Ecosystem Habitat Goals Update Report, the 2010 Subtidal Habitat Goals Report, and the 2019 Adaptation Atlas, detail wetlands habitat restoration goals, subtidal habitat restoration goals, and shoreline adaptation strategies throughout Bay. These frameworks are based on the best available science at this time, and as our knowledge evolves to reflect new data and understanding, new frameworks or updated frameworks may be developed to replace or supplement this work.</u></p>	<p>While BCDC recognizes that staff analyses should always reflect the most up-to-date and best available science, it is important to acknowledge the milestones represented by several key regional strategies for habitat restoration and adaptation. In other findings, the Bay Plan notes that regional restoration goals have been developed for wetland areas but does not recognize the Subtidal Habitat Restoration Goals Project. These can be an important point of reference for staff even as new science becomes available. More support for this finding can be found in the Background Report Chapter 6. This finding supports Fish, Other Aquatic Organisms, and Wildlife policy 3.</p>

Fish, Other Aquatic Organisms, and Wildlife	
Draft Findings Changes	Staff Analysis
<p><u>j. Current models indicate that as sea level rise progresses, many Bay habitats will be degraded or convert to other habitat types. Projects that place fill to ensure that fish, other aquatic organisms, wildlife, and plants have habitat into the future may also result in the conversion of one type of habitat into another and thus may result in a net loss of some habitat types and associated ecosystem functions. Habitat type conversion could alter the balance of species or habitats locally, within an embayment, or on a regional scale. Large-scale habitat type conversion could reduce the amount of habitat available to certain species, and the impacts of large-scale habitat type conversion are not well-understood.</u></p>	<p>The allowance of more fill in the Bay may result in habitat type conversion. Restoration projects have resulted in type conversion in the past, typically in restoring diked historic baylands or salt ponds to convert them to tidal waters or marsh. However, the Bay Plan does not explicitly acknowledge habitat type conversion or the associated challenges. More support for this finding can be found in the Background Report Chapter 7. This finding supports Fish, Other Aquatic Organisms, and Wildlife policy 7.</p>
<p><u>k. Tidal marshes and tidal flats are particularly vulnerable to inundation from sea level rise, reductions in sediment supply, and lack of migration space. Current scientific predictions of sea level rise and declining sediment supply support the likelihood that many marshes and mudflats may not be able to adapt to these changes, and may be inundated by the end of the century if they are not able to accrete sediment and/or migrate to higher elevations. Placing sediment in appropriate locations will be needed to ensure that Bay species have sufficient habitat into the future. Placement of significant volumes of sediment will be particularly important in tidal marshes to build transition zones, increase marsh plain elevation, and create high tide refugia for species. Placement of sediment may also be necessary in shallow intertidal or subtidal areas to increase mudflat elevation or to increase the sediment that can be transported by natural processes to adjacent marshes to increase marsh plain elevation. Little is known</u></p>	<p>The Bay Plan does not currently address the threat of inundation and loss posed to tidal marshes, tidal flats, and shallow subtidal areas by sea level rise and insufficient sediment supply. This finding acknowledges the threats, and the potential need for large volumes of sediment to increase habitat resilience, which would in turn provide habitat for the Bay's fish, other aquatic organisms, and wildlife into the future. It is important to acknowledge this driving force for allowing more fill for habitat projects in the Bay Plan findings. At the same time, there is limited scientific information about deep subtidal habitats and the need for sediment placement there, so caution is recommended in those areas. More support for this finding can be found in the Background Report Chapters 2 and 6. This finding supports Fish, Other Aquatic Organisms, and Wildlife policy 8.</p>

Fish, Other Aquatic Organisms, and Wildlife	
Draft Findings Changes	Staff Analysis
<p><u>about how subtidal areas will adapt to sea level rise or the need for sediment in these areas. Limited knowledge about deep water habitats makes it difficult to predict how major changes, including sediment placement, in these areas may adversely affect fish, other aquatic organisms, and wildlife.</u></p>	
<p><u>I. Bay habitats are dynamic, ever-evolving systems that are predicted to change even more with sea level rise. The amount of fill required to ensure the persistence of these habitats into the future will depend on the rate of sea level rise and the time horizon of the project. For example, more fill will likely be required to sustain marsh elevations through the year 2100 than through the year 2050. Placement of large volumes of fill to assist habitats in adapting to long-term sea level rise projections may not be immediately necessary and may result in unnecessary habitat type conversion and other impacts to the Bay. Placing smaller volumes of fill incrementally could serve the function of facilitating habitat adaptation to sea level rise while also minimizing impacts of fill to fish, other aquatic organisms, and wildlife. Smaller environmental perturbations that are similar in scale to a natural disturbance events, such as sediment deposition following a flood event, are more likely to allow habitats to adapt and rebound than a major perturbation that could take much longer for habitats and species to recover.</u></p>	<p>This finding has been added to address an approach for fill for habitat adaptation intended to minimize impacts to the Bay. This will be helpful in guiding appropriate project design and determination of “minimum fill necessary”. More support for this finding can be found in the Background Report Chapters 7 and 8. This finding supports Fish, Other Aquatic Organisms, and Wildlife policy 6.</p>

Fish, Other Aquatic Organisms, and Wildlife	
Draft Policy Changes	Staff Analysis
<p>2. Specific habitats that are needed to conserve, increase or prevent the extinction of Any native species; species threatened or endangered species; species that the California Department of Fish and Wildlife Game, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service have has determined are candidates for listing as endangered or threatened under the California or Federal Endangered Species Act; or any species that provides substantial public benefits, <u>as well as specific habitats that are needed to conserve, increase, or prevent the extinction of these species</u>, should be protected, whether in the Bay or behind dikes. <u>Protection of habitats may entail placement of fill to ensure that they persist into the future with sea level rise.</u></p>	<p>This policy was modified to state that both species and their habitats should be protected. Additionally, a point is added to note that “protection” could include sea level rise adaptation strategies like placement of sediment to augment marsh plain elevation, as habitats may be lost altogether in some cases if these approaches aren’t used. Staff corrected California Department of Fish and Wildlife’s name and added National Marine Fisheries Service and the U.S. Fish and Wildlife Service to reflect these federal agencies role in protecting special status species. More details can be found in the Background Report Chapter 7.</p>
<p>3. In reviewing or approving habitat restoration <u>projects or programs</u> the Commission should be guided by <u>the best available science, including regional goals, the recommendations in the Baylands Ecosystem Habitat Goals report</u> and should, where appropriate, provide for a diversity of habitats to enhance opportunities for a variety of associated native aquatic and terrestrial plant and animal species.</p>	<p>Review of habitat projects should use the best available science on regional restoration goals, which will change over time and edited the policy for clarity. Support for this policy can be found in the Background Report Chapter 6.</p>
<p>4. The Commission should:</p> <ul style="list-style-type: none"> • Consult with the California Department of Fish and Wildlife Game, and the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, whenever a proposed project may adversely affect an endangered or threatened plant, fish, other aquatic organism or wildlife species; • Not authorize projects that would result in the "taking" of any plant, fish, other aquatic organism or wildlife species listed as endangered or 	<p>The policy is edited slightly to update the name of the California Department of Fish and Wildlife, and otherwise improve consistency in capitalization and abbreviation across the policies.</p>

Fish, Other Aquatic Organisms, and Wildlife	
Draft Policy Changes	Staff Analysis
<p>threatened pursuant to the state or federal Endangered Species Acts, or the federal Marine Mammal Protection Act, or species that are candidates for listing under these <u>acts</u> California Endangered Species Act, unless the project applicant has obtained the appropriate "take" authorization from the U.S. Fish and Wildlife Service, National Marine Fisheries Service or the California Department of Fish and Wildlife Game; and</p> <ul style="list-style-type: none"> • Give appropriate consideration to the recommendations of the California Department of Fish and Wildlife Game, the National Marine Fisheries Service or the United States <u>U.S.</u> Fish and Wildlife Service in order to avoid possible adverse effects of a proposed project on fish, other aquatic organisms and wildlife habitat. 	
<p>5. The Commission may permit a minor amount of fill or a minimum amount of dredging in wildlife refuges, shown on the Plan Maps, necessary to enhance <u>or restore</u> fish, other aquatic organisms and wildlife habitat; <u>or a minor amount of fill</u> or to provide public facilities for wildlife observation, interpretation and education.</p>	<p>This policy was initially created in 2002 to allow some fill that could be needed for habitat restoration or enhancement in wildlife refuges (defined quite broadly in the Bay Plan as almost any area that provides wildlife habitat) but was intended to still protect these areas by limiting large-scale filling. However, the future need to protect Bay habitats from rising sea level will potentially require substantial volumes of fill placement, so this volume restriction no longer serves its initial intent. Additionally, the McAteer-Petris Act states that all projects must use the minimum amount of fill necessary for the project purpose, which maintains an important protection</p>

Fish, Other Aquatic Organisms, and Wildlife	
Draft Policy Changes	Staff Analysis
	to ensure that projects cannot use an excessive amount of fill, and are required to justify the proposed fill. This safeguards against issues with removal of “minor”. More information can be found in the Background Report Chapter 5.
<u>6. Habitat restoration or enhancement projects in the Bay that need fill to adapt to rising seas should plan for repeated placements of fill over time to allow habitat to adapt incrementally to sea level rise projections, reducing the need for large scale habitat loss and conversion prior to the onset of future conditions, unless the Commission finds that fewer, larger placements of fill minimize impacts to Bay organisms or that small, repeated fills are not feasible.</u>	The placement of fill to increase the resilience of Bay habitats, especially techniques such as thin-layer placement to augment marshes, or create transition zones, may be more effective and less harmful when placed incrementally in multiple applications. Therefore, this policy has been added to address an approach for fill for habitat adaptation intended to minimize impacts to the Bay. This will be helpful in guiding appropriate project design and determination of “minimum fill necessary”. This policy is supported by Chapters 6-8 of the Background Report.
<u>7. Allowable fill for habitat projects in the Bay should (a) not cause substantial negative impacts to existing habitats; (b) be scaled appropriately for the project and necessary sea level rise adaptation measures; and (c) not significantly alter the balance of species or habitats within an embayment or on a regional scale, unless the project restores areas that have been lost with rising level.</u>	Placing larger volumes of fill in the Bay has the potential to negatively impact existing habitats, and to convert existing habitats into other habitat types. Decisions about when and where habitat type conversion are complex, and so are typically made on a case-by-case basis. This policy introduces general guiding principles to consider and weigh when assessing the potential impacts of a fill for habitat project. More support for this policy can be found in Chapters 7-8 of the Background Report.

Fish, Other Aquatic Organisms, and Wildlife	
Draft Policy Changes	Staff Analysis
<p><u>8. Sediment placement for habitat adaptation should be prioritized in subsided diked baylands, tidal marshes, and tidal flats, as these areas are particularly vulnerable to inundation and loss due to sea level rise and lack necessary sediment supply, or in shallow subtidal areas to support tidal marsh, tidal flat, and eelgrass bed adaptation. A minor amount of sediment placement for any habitat project in deep subtidal areas may be authorized if sediment placement will maximize the habitat restoration or enhancement benefits provided by the project.</u></p>	<p>The Bay Plan does not currently address the threat posed to tidal marshes, tidal flats, and shallow subtidal areas by sea level rise and insufficient sediment supply for all of these areas to keep pace with sea level rise. This policy acknowledges the threats, and the potential need for large volumes of fill to increase habitat resilience in these areas, which would in turn provide habitat for the Bay’s fish, other aquatic organisms, and wildlife into the future. It therefore prioritizes projects in these areas. At the same time, we know very little about deep subtidal habitats and the needs for sediment placement there, so caution is recommended for sediment placement in those areas. More support for this policy can be found in the Background Report Chapters 2 and 6.</p>

Tidal Marshes and Tidal Flats. The staff preliminarily recommends the Commission revise the findings and policies in the “Tidal Marshes and Tidal Flats” policy section as shown in the draft language below.

Tidal Marshes and Tidal Flats	
Draft Findings Changes	Staff Analysis
<p>g. The Baylands Ecosystem Habitat Goals <u>Science Update</u> report provides a regional vision of the types, amounts, and distribution of <u>baylands</u> 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 <u>2010s</u>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.</p>	<p>The Baylands Ecosystem Habitat Goals report was written in 1999, and the initial goals and findings of the report were reassessed in 2015 in light of new sea level rise predictions and other environmental changes. To ensure that the Bay Plan reflects the best available science, the reference to this report is updated to reflect the report’s most recent version.</p>
<p>k. Landward marsh migration <u>will</u> may be necessary to sustain marsh acreage around the Bay as sea level rises. As sea level rises, high-energy waves erode <u>inorganic mud sediment</u> 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. <u>Transition zones, depending on the size and slope, provide high tide refugia for organisms as sea level rises, as well as important opportunities for marsh migration upslope and inland as sea level rises, but are limited in the long-term unless connected to other higher elevation areas of land.</u></p>	<p>This finding is updated to reflect that transition zones will provide high tide refugia and migration space for wetland habitats, but that ultimately even transition zones may not provide the space needed for marshes to persist with sea level rise.</p>

Tidal Marshes and Tidal Flats	
Draft Findings Changes	Staff Analysis
<p>I. Sedimentation is an essential factor in the creation, maintenance and growth of tidal marsh and tidal flat habitat. Scientists studying the Bay have observed that 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 <u>marshes and tidal flats</u> may also accelerate, thus potentially exacerbating shoreline erosion and adversely affecting the ecosystem and the sustainability of ecosystem restoration projects. An adequate supply of sediment is necessary to ensure resilience of the Bay ecosystem as sea level rise accelerates. <u>To ensure that tidal marshes and tidal flats have an adequate supply of sediment, it is important to restore complete tidal wetland systems connected to the physical processes that sustain them. This includes reconnecting watersheds to intertidal habitats, supporting organic and inorganic sediment accretion necessary for these habitats to maintain sufficient elevation to support tidal marsh vegetation as sea level rises. Tidal marshes that are well-connected and established with full functionality are more likely to adapt and provide ongoing benefits if the rate of sea level rise accelerates as current climate models predict. Further, the reconnection of tidal marshes to local tributaries will likely re-establish lost habitats such as adjacent brackish marsh and willow sausals.</u></p>	<p>This finding already provides information on the need for sediment for tidal marshes and tidal flats to adapt to sea level rise, but does not acknowledge the importance of reconnecting watersheds and restoring connectivity for increasing sediment supply and overall tidal marsh/tidal flat resilience. The Baylands Ecosystem Habitat Goals Science Update (2015) emphasized the importance of restoring natural processes by restoring complete, well-connected baylands by 2030 in order to ensure that these ecosystems can adapt to sea level rise. More support for this finding can be found in the Background Report Chapter 6. This finding supports Tidal Marshes and Tidal Flats policies 5 and 6.</p>

Tidal Marshes and Tidal Flats	
Draft Findings Changes	Staff Analysis
<p><u>q. Natural site characteristics, including geomorphic setting, suspended sediment concentration, current velocities, water depth, benthic substrate, salinity, light availability, habitat connectivity, and other factors, shape which habitats can establish and be sustained in any given part of the Bay. Siting a project in a location where the appropriate natural processes do not exist to sustain it could result in negative impacts on the Bay, project failure, and wasted resources.</u></p>	<p>This finding is added to highlight some of the factors that could determine whether a habitat is sustainable, and to note the potential negative outcomes that could result from siting a project in an area that it is not sustainable. More support for this finding can be found in the Background Report Chapter 6. This finding supports Tidal Marshes and Tidal Flats policies 5 and 6.</p>
<p><u>r. Pilot and demonstration projects provide an opportunity for research and testing concepts and techniques before implementing experimental projects on a large scale.</u></p>	<p>Pilot and demonstration projects will be important to address the uncertainty surrounding methods, including fill for habitat approaches, that have not been tested in the Bay. While these projects can be permitted under BCDC's current policies, their importance as a research and learning mechanism are not acknowledged in the Bay Plan. Support for this finding can be found in the Background Report Chapter 8. This finding supports Tidal Marshes and Tidal Flats policy 10.</p>
<p><u>s. Coordinated regional monitoring has the potential to reduce monitoring costs and requirements for individual projects, and improve understanding of regional status and trends, restoration needs and project design by synthesizing and analyzing information from habitat projects across the region.</u></p>	<p>While BCDC typically requires monitoring of individual projects, regional monitoring can provide benefits that are different from and complimentary to project-based monitoring, and may provide opportunities for uses of surrogate monitoring. The San Francisco Estuary Institute is developing a coordinated regional wetland monitoring program, that could provide some of these benefits. Sharing of monitoring data and reports among agencies and restoration practitioners throughout the region will help all involved to better assess restoration needs and most appropriate project designs.</p>

Tidal Marshes and Tidal Flats	
Draft Findings Changes	Staff Analysis
	Support for this finding can be found in the Background Report Chapter 8. This finding supports policy 8.
<p><u>t. 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 outcomes from alternative management options. Effective adaptive management requires setting clear and measurable objectives, collecting data, reviewing current scientific observations, monitoring the results of actions, policy implementation or management, and integrating this information into future actions. Adaptive management of habitat projects can be particularly useful when there is uncertainty around project design, potential outcomes, changing conditions, and/or for large projects with greater potential for impacts. In these situations, adaptive management can increase the likelihood of project success and reduce the risk of impacts to Bay organisms and ecosystems.</u></p>	<p>This finding is added to define adaptive management, and to note the use of adaptive management as a tool for dealing with uncertainty and mediating risk, especially when dealing with sea level rise and novel habitat restoration approaches in the Bay. Support for this finding can be found in the Background Report Chapter 8. This finding supports Tidal Marsh and Tidal Flats policies 6 and 7.</p>
<p><u>u. The extent of uncertainty about appropriate habitat project design (including likelihood of success and risk of impacts) varies depending on the project's goals (e.g. whether the project has a research component), lifespan (e.g. whether the habitat is intended to adapt to sea level rise or not), and scale. Smaller projects and projects constructed using well-vetted techniques will likely involve less uncertainty and/or risk than larger habitat projects anticipated to need adaptation over time, or projects testing new approaches. Projects with higher levels of uncertainty or risk may require more intensive monitoring and adaptive management.</u></p>	<p>This finding acknowledges that the level of uncertainty and risk associated with habitat projects vary depending on several aspects of the project. The uncertainty and risk associated with a project, as well as its size, should be considered when determining how much monitoring and adaptive management is required. Support for this finding can be found in the Background Report Chapter 8. This finding supports Tidal Marsh and Tidal Flats policy 7.</p>

Tidal Marshes and tidal Flats	
Draft Policy Changes	Staff Analysis
<p><u>4. Local government land use and tax policies should not lead to the conversion of restorable lands to uses that would preclude or deter potential restoration. The public should make every effort to acquire these lands for the purpose of habitat restoration and wetland migration.</u></p>	<p>This policy had been a part of Tidal Marshes and Tidal Flats policy 4 (now policy 5), but since it introduces a distinct idea from the rest of the content of Tidal Marsh and Tidal Flats policy 5, it has been separated into its own policy.</p>
<p><u>5. 4- Where 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 2015 Baylands Ecosystem Habitat Goals Update report, around 65,000 acres of areas diked from the Bay should be restored to tidal action and supported to maintain a healthy Bay ecosystem on a regional scale. Habitat projects should be designed to be sustainable by natural processes to the greatest extent feasible. Habitat projects should restore, create, or enhance ecosystem integrity by increasing habitat connectivity and restoring hydrological connections. Regional ecosystem targets should be updated periodically to incorporate the best available science to guide regionally appropriate conservation, restoration, and climate adaptation. 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 for the purpose of habitat restoration and wetland migration.</u></p>	<p>The Baylands Ecosystem Habitat Goals report was written in 1999, and the initial goals and findings of the report were reassessed in 2015 in light of new sea level rise predictions and other environmental changes. To ensure that the Bay Plan reflects the best available science, the reference to this report should be updated to reflect the report's most recent version. Additionally, the Baylands Ecosystem Habitat Goals Science Update (2015) emphasized the importance of restoring complete, well-connected baylands by 2030 in order to ensure that these ecosystems can adapt to sea level rise, and the Adaptation Atlas has addressed the importance of placing shoreline adaptation strategies in locations where they are sustainable by natural processes. The importance of considering these findings in habitat restoration projects is not yet reflected in the Bay Plan. This policy is supported in the Background Report Chapter 6.</p>

Tidal Marshes and tidal Flats	
Draft Policy Changes	Staff Analysis
<p>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.</p>	<p>This policy has been grouped with other policies (both existing and new) that encourage the Commission to support research on several topics related to habitat restoration and sustainability in the Bay.</p>
<p>6. Any ecosystem restoration <u>habitat</u> project should include clear and specific long-term and short-term biological and physical goals, and success criteria, and a monitoring program, <u>and as appropriate, an adaptive management plan to assess <u>benefits, impacts, the likelihood of success, and sustainability</u> of the project.</u> Design and evaluation of the project should include an analysis of: (a) how the system's <u>project's</u> 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 <u>and local embayment's</u> 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; (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; <u>(k) how the project adheres to regional restoration goals; (l) whether the project would be sustained by natural processes; and (m) how the project restores, enhances, or creates connectivity across Bay habitats at a local, sub-regional, and/or regional scale.</u> If success criteria are not met, benefits and impacts should be analyzed and appropriate adaptive measures should be <u>taken. If substantial adverse impacts to the Bay or species have occurred; the project should be further modified to reduce its impacts.</u></p>	<p>Changes to this policy recognize that adaptive management plans should also be included in project planning in many cases. Also, additional analyses are required during the design and evaluation of the project to assess how the project fits within regional restoration frameworks/goals, a consideration of whether the project can be sustained by natural processes, and how the project restores connectivity. These additions are intended to require that applicants consider best available science in project design, especially the findings and framework of the Baylands Ecosystem Habitat Goals Science Update and the Adaptation Atlas. Additions are supported in the Background Report Chapters 6 and 8.</p>

Tidal Marshes and tidal Flats	
Draft Policy Changes	Staff Analysis
<p>7. The Commission should continue to support and encourage the expansion of scientific information on the arrival and spread of invasive plants and animals, and when feasible, support the establishment of a regional effort for Bay-wide eradication of specific invasive species, such as non-native cordgrasses.</p>	<p>This Tidal Marsh and Tidal Flats policy is grouped with other policies (both existing and new) later in the document that encourage the Commission to support research on several topics related to habitat restoration and sustainability in the Bay.</p>
<p><u>7. The level of design; amount, duration, and extent of monitoring; and complexity of adaptive management plan required for a habitat project should be consistent with the purpose, size, impact, level of uncertainty, and/or expected duration (lifespan) of the project. Habitat projects should have a funding plan for monitoring and adaptive management of the project, commensurate with the level of monitoring and adaptive management that the required for the project.</u></p>	<p>While appropriate design, monitoring, and management are important for all projects, the extent and degree to which each of these aspects is necessary differs from project to project. For example, projects that are small and/or low-impact should not be burdened with the same extent of monitoring and design requirements as larger, more impactful projects, nor do they have the budget to support these efforts. Similarly, projects for which research is a primary goal should require more thorough monitoring programs. Nonetheless, all projects should demonstrate that they have adequate funding or plans for obtaining funding to complete any necessary monitoring and adaptive management, or else there is a greater risk of project failure/impacts to the Bay. This Tidal Marsh and Tidal Flats policy is supported by the Background Report Chapter 8.</p>
<p><u>8. The Commission should encourage and support regional efforts to collect, analyze, share, and learn from habitat monitoring data.</u></p>	<p>While BCDC typically requires monitoring of individual projects, regional monitoring can provide benefits that are different from and complimentary to project-based monitoring, and may provide opportunities for uses of surrogate monitoring. The San Francisco Estuary Institute is developing a coordinated regional wetland monitoring program</p>

Tidal Marshes and tidal Flats	
Draft Policy Changes	Staff Analysis
	<p>that could provide some of these benefits. Sharing of monitoring data and reports among agencies and restoration practitioners throughout the region will help all involved to better assess restoration needs and most appropriate project designs. Support for this Tidal Marsh and Tidal Flats policy can be found in the Background Report Chapter 8.</p>
<p>9. 8. Based on scientific ecological analysis, <u>project need</u>, and consultation with the relevant federal and state resource agencies, a minor amount of fill may be authorized for habitat enhancement, restoration, or sea level rise adaptation to enhance or restore fish, other aquatic organisms or wildlife habitat if the Commission finds that no other method of enhancement or restoration except filling is feasible <u>filling is necessary to achieve the habitat restoration, enhancement, or sea level rise adaptation goals of the project.</u></p>	<p>This policy was initially created in 2002 to allow some fill that could be needed for habitat restoration or enhancement in tidal marshes and tidal flats but was intended to still protect these areas by limiting large-scale filling. However, the future need to protect Bay habitats from rising sea level will potentially require substantial volumes of fill placement, so this volume restriction serves its initial intent, but the rationale for the limitation has been superseded by the change in climatic conditions. Additionally, the McAteer-Petris Act states that all projects must use the minimum amount of fill necessary for the project purpose, which maintains an important protection to ensure that projects cannot use an excessive amount of fill, and projects are still required to meet the fill tests therein. This safeguards against issues with removal of “minor”. More information can be found in the Background Report Chapter 5.</p>

Tidal Marshes and tidal Flats	
Draft Policy Changes	Staff Analysis
<p><u>10. The Commission should encourage and authorize pilot and demonstration projects when the potential benefits are greater than the potential risks. These projects should include appropriately detailed experimental design and monitoring to inform initial and future work. Project outcomes should be analyzed and reported expeditiously, so that findings can be applied to future projects. The size, design, and management of pilot and demonstration projects should be such that it will minimize the project's potential to negatively impact Bay habitats and species.</u></p> <p><u>11. The Commission should encourage and support research and action on the following topics:</u></p> <ul style="list-style-type: none"> a. <u>Habitat restoration, enhancement, and creation approaches, especially research that will inform strategies to make Bay habitats more resilient to sea level rise, investigate fill placement approaches, impacts of habitat type conversion, strategies for enhancing habitat connectivity, and transition zone design;</u> b. <u>Comprehensive Bay sediment research and monitoring to understand sediment processes necessary to sustain and restore wetlands, including periodic updates to monitoring methods based on current scientific information; and</u> c. <u>Detection and monitoring of invasive plants and animals, including the establishment of regional efforts for Bay-wide eradication of specific invasive species.</u> 	<p>This policy is added to explicitly state the overall need for experimentation and research via pilot and/or demonstration projects. Additionally, language is provided to guide the design and execution of these projects. Further support for this Tidal Marsh and Tidal Flats policy can be found in the Background Report Chapter 8.</p> <p>The importance of encouraging research on best techniques to restore, create, or enhance Bay habitats, especially in light of sea level rise, is not emphasized in the Bay Plan. Developing a better understanding of approaches that are required for habitat adaptation to sea level rise will be especially important. Additionally, other policies encouraging research were re-located here. Support for this Tidal Marsh and Tidal Flats policy can be found in the Background Report Chapters 6, 7, and 8.</p>

Subtidal Areas. The staff preliminarily recommends the Commission revise the findings and policies in the “Subtidal Areas” policy section as shown in the draft language below.

Subtidal Areas	
Draft Findings Changes	Staff Analysis
<p>j. Fill material, such as rock, oyster shells and sediments dredged from the Bay, <u>or hybrid materials that integrate these materials</u>, can enhance or beneficially contribute to the restoration of subtidal habitat by: (1) creating varied subtidal areas beneficial to aquatic species, such as Pacific herring, <u>and other wildlife including birds</u>; (2) restoring, <u>creating, or enhancing</u> native oyster <u>populations</u> and other nearshore reefs <u>shellfish beds that benefit multiple species</u>; (3) enhancing subtidal plant communities, such as eelgrass beds; and (4) recreating the bathymetry of disturbed areas, such as dredged channels.</p>	<p>Some aspects of the best available science on use of fill materials for habitat projects were not included in this finding. The finding as written here is updated to more accurately reflect this information and techniques.</p>
<p>k. <u>Pilot and demonstration projects provide an opportunity for research and testing concepts and techniques before implementing experimental projects on a large scale.</u></p>	<p>Pilot and demonstration projects will be an important tool to address the uncertainty surrounding new methods, including habitat approaches that use fill and/or have not been tested in the Bay. While these projects can be permitted under BCDC’s current policies, their importance as a research and learning mechanism are not acknowledged in the Bay Plan. Support for this finding can be found in the Background Report Chapter 8. This finding supports Subtidal Areas policy 8.</p>
<p>l. <u>Coordinated regional monitoring of habitats and habitat projects has the potential to reduce monitoring costs and requirements for individual projects, and to improve understanding of restoration needs and project design by synthesizing information from habitat projects across the region.</u></p>	<p>While BCDC typically requires monitoring of individual projects, regional monitoring can provide benefits that are different from and complimentary to project-based monitoring, and may provide opportunities for uses of surrogate monitoring. Sharing of monitoring data and reports among agencies and restoration practitioners throughout the region will help all involved to better assess restoration needs and most appropriate project designs. Support for this finding can be found in the Background Report Chapter 8. This finding supports Subtidal Areas policy 5.</p>

Subtidal Areas	
Draft Findings Changes	Staff Analysis
<p><u>m. Regional subtidal habitat goals, included in the San Francisco Bay Subtidal Habitat Goals Report (2010), incorporate the best available science at the time of publication; establish regional consensus on the science needed to improve our understanding of subtidal areas; and determine specific subtidal habitats that should be conserved, restored, or created. As knowledge of these areas improve, the regional goals report should be updated.</u></p>	<p>The Bay Plan does not currently acknowledge the progress that has been made toward setting regional subtidal habitat goals. More support for this finding can be found in the Background Report Chapter 6. This finding supports Subtidal Areas policy 3.</p>
<p><u>n. 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 outcomes from alternative management options. Effective adaptive management requires setting clear and measurable objectives, collecting data, reviewing current scientific observations, monitoring the results of actions, policy implementation or management, and integrating this information into future actions. Adaptive management of habitat projects can be particularly useful when there is uncertainty around project design, potential outcomes, changing conditions, and/or for large projects with greater potential for impacts. In these situations, adaptive management can increase the likelihood of project success and reduce the risk of impacts to Bay organisms and ecosystems.</u></p>	<p>This finding is added to define adaptive management, and to note the use of adaptive management as a tool for dealing with uncertainty and mediating risk, especially when dealing with sea level rise and novel habitat restoration approaches in the Bay. Support for this finding can be found in the Background Report Chapter 8. This finding supports Subtidal Areas policies 3 and 4.</p>

Subtidal Areas	
Draft Findings Changes	Staff Analysis
<p><u>o. The extent of uncertainty about appropriate habitat project design (including likelihood of success and risk of impacts) varies depending on the project's goals (e.g. whether the project has a research component), lifespan (e.g. whether the habitat is intended to adapt to sea level rise or not), and scale. Smaller projects and projects constructed using well-vetted techniques will likely involve less uncertainty and/or risk than larger habitat projects anticipated to need adaptation over time, or projects testing new approaches. Projects with higher levels of uncertainty or risk may require more intensive monitoring and adaptive management.</u></p>	<p>This finding acknowledges that the level of uncertainty and risk associated with habitat projects vary depending on several aspects of the project. The uncertainty and risk associated with a project, as well as its size, must be considered to determine how much monitoring and adaptive management may be required. Support for this finding can be found in the Background Report Chapter 8. This finding supports Subtidal Areas policy 4.</p>
<p><u>p. Natural site characteristics, including geomorphic setting, suspended sediment concentration, current velocities, water depth, benthic substrate, salinity, light availability, habitat connectivity, and other factors shape which habitats can establish and be sustained in any given part of the Bay. Siting a project in a location where the appropriate natural processes do not exist to sustain it could result in negative impacts on the Bay, project failure, and wasted resources.</u></p>	<p>This finding is added to highlight some of the factors that could determine whether a habitat is sustainable, and to note the potential negative outcomes that could result from siting a project in an area where physical processes and other factors would not sustain it. Support for this finding can be found in the Background Report Chapter 6. This finding supports Subtidal Areas policies 3 and 9</p>

Subtidal Areas	
Draft Policy Changes	Staff Analysis
<p><u>3. 4. Any subtidal habitat restoration project should include clear and specific long-term and short-term biological and physical goals, and success criteria, and a monitoring program, and as appropriate, an adaptive management plan to assess the likelihood of success, benefits, impacts, and sustainability of the project. Design and evaluation of the project should include an analysis of: (a) the scientific need for the project; (b) the effects of relative sea level rise; (c) the impact of the project on the Bay's sediment budget; (d) localized sediment erosion and accretion; (e) the role of tidal flows; (f) potential invasive species introduction, spread and their control; (g) rates of colonization by vegetation, where applicable; (h) the expected use of the site by fish, other aquatic organisms and wildlife; and (i) characterization of and changes to local bathymetric features; (k) how the project will adhere to the best available science on regional subtidal restoration and conservation goals; and (l) whether the project would be sustained by natural processes. If success criteria are not met, benefits and impacts should be analyzed and appropriate adaptive measures should be taken. If substantial adverse impacts to the Bay or species have occurred, the project should be further modified to reduce its impacts.</u></p>	<p>Changes to this policy recognize that adaptive management plans should also be included in subtidal project planning in many cases. Additional analyses are required during the design and evaluation of the project to assess whether the project is aligned with regional restoration frameworks/goals, consideration of project sustainability supported by natural processes, and whether the project restores connectivity. These additions are intended to ensure the best available science is used in project design and analysis, and gives special consideration to the findings and framework of the Subtidal Goals Report and Adaptation Atlas. This policy is supported by the Background Report Chapters 6 and 8.</p>
<p><u>4. The level of design; amount, duration, and extent of monitoring; and complexity of adaptive management plan required for a habitat project should be consistent with the purpose, size, impact, level of uncertainty, and/or expected duration (lifespan) of the project. Habitat projects should have a funding plan to monitor and adaptively manage the project, commensurate with the level of monitoring and adaptive management that the project will require.</u></p>	<p>While appropriate design, monitoring, and management are important for all projects, the extent and degree to which each of these aspects is necessary differs from project to project. For example, the design, monitoring and adaptive management should be appropriately scaled with the project size and complexity due to potential impacts and project funding. Similarly, research projects (for which the primary goal of the project is research or testing methods) should require more thorough monitoring programs to inform future efforts. All projects should demonstrate that they have adequate funding or plans to obtain funding to complete any necessary monitoring and adaptive management. Support for this Subtidal Areas policy can be found in the Background Report Chapter 8.</p>

Subtidal Areas	
Draft Policy Changes	Staff Analysis
<p><u>5. The Commission should encourage and support regional efforts to collect, analyze, share, and learn from habitat monitoring data.</u></p>	<p>While BCDC typically requires monitoring of individual projects, regional monitoring can provide benefits that are different from and complimentary to project-based monitoring, and may provide opportunities for uses of surrogate monitoring. Sharing of monitoring data and reports among agencies and restoration practitioners throughout the region will help all involved to better assess restoration needs and most appropriate project designs. Support for this Subtidal Areas policy can be found in the Background Report Chapter 8.</p>
<p>6.3. Subtidal restoration projects should be designed to: (a) promote an abundance and diversity of fish, other aquatic organisms and wildlife; (b) restore rare subtidal areas; (c) establish linkages between deep and shallow water and tidal and subtidal habitat in an effort to maximize habitat values for fish, other aquatic organisms and wildlife; or (d) expand open water areas in an effort to make the Bay larger .</p>	<p>This Subtidal Areas policy was relocated to be near the other policy specifically addressing habitat restoration and/or enhancement projects, as opposed to all habitat projects. The policy number has been changed accordingly.</p>
<p>7.6. Based on scientific ecological analysis and consultation with the relevant federal and state resource agencies, a minor amount of fill may be authorized <u>for habitat enhancement, restoration, or sea level rise adaptation to enhance or restore fish, other aquatic organisms or wildlife habitat</u> if the Commission finds that no other method of enhancement or restoration except filling is feasible.</p>	<p>This policy was initially created in 2002 to allow some fill that could be needed for habitat restoration or enhancement in subtidal areas, but was intended to still protect these areas by limiting large-scale filling. However, the future need to protect Bay habitats from rising sea level will potentially require substantial volumes of fill placement, so this volume restriction no longer serves its initial intent.</p> <p>Additionally, the McAteer-Petris Act states that all projects must use the minimum amount of fill necessary for the project purpose, which maintains an important protection to ensure that projects cannot use an excessive amount of fill, and projects are still required to meet the fill tests therein. This safeguards against issues with removal of “minor”. More information can be found in the Background Report Chapter 5.</p>

Subtidal Areas	
Draft Policy Changes	Staff Analysis
<p><u>8. The Commission should encourage and authorize pilot and demonstration projects when the potential benefits are greater than the potential risks. These projects should include appropriately detailed experimental design and monitoring to inform initial and future work. Project outcomes should be analyzed and reported expeditiously, so that findings can be applied to future projects. The size, design, and extent of monitoring and management of pilot and demonstration projects should be such that it will minimize the project's potential to negatively impact Bay habitats and species.</u></p>	<p>This policy is added to explicitly state the overall need for experimentation and research via pilot and/or demonstration projects. Additionally, language is provided to guide the design and execution of these projects. More support for this Subtidal Areas policy can be found in the Background Report Chapter 8.</p>
<p>9. The Commission should continue to support and encourage expansion of scientific information on the Bay's subtidal areas, including: (a) inventory and description of the Bay's subtidal areas; (b) the relationship between the Bay's physical regime and biological populations; (c) sediment dynamics, including sand transport, and wind and wave effects on sediment movement; (d) areas of the Bay used for spawning, birthing, nesting, resting, feeding, migration, among others, by fish, other aquatic organisms and wildlife; and (e) where and how <u>habitat restoration, enhancement, and creation should occur considering species/habitat needs and suitable project sites; and (f) if, where, and what type of habitat type conversion may be acceptable.</u></p>	<p>To further the goals of regional assessment in habitat restoration, regional habitat needs should be considered in the determination of where and how restoration should occur. Additionally, more research is needed to support decisions involving habitat conversion to facilitate the Commission's assessment of future projects.</p>

Dredging. The staff preliminarily recommends the Commission revise the findings and policies in the “Dredging” policy section as shown in the draft language below.

Dredging	
Draft Findings Changes	Staff Analysis
<p>n. Baywide studies would help determine the need for, appropriate locations for, and potential effects of in-Bay disposal <u>the use of dredged sediment</u> for eelgrass or other shallow water habitat enhancement or restoration. The Commission has approved a pilot project, the Oakland Middle Harbor enhancement project, that could help to determine the feasibility of eelgrass or other shallow water habitat enhancement or restoration in the Bay.</p>	<p>The second part of this finding is no longer necessary to support a policy in the Dredging section regarding the Oakland Middle Harbor Enhancement Project.</p>
Draft Policy Changes	Staff Analysis
<p>11. a. A project that uses dredged <u>sediment material</u> to create, restore, or enhance Bay or certain waterway natural resources may should <u>only</u> be approved if:</p> <ol style="list-style-type: none"> 1. The Commission, based on detailed site specific studies, appropriate to the size and potential impacts of the project, that include, but are not limited to, site morphology and physical conditions, biological considerations, the potential for fostering invasive species, dredged <u>sediment material</u> stability, and engineering aspects of the project, determines all of the following: <ol style="list-style-type: none"> a. the project would provide, in relationship to the project size, substantial net improvement in habitat for Bay species; b. no feasible alternatives to the fill exist to achieve the project purpose with fewer adverse impacts to Bay resources; 	<p>A component is added to this policy to ensure that dredged sediment placement for habitat projects is performed in accordance with the best available science.</p>

Dredging	
Draft Policy Changes	Staff Analysis
<p>c. the amount of dredged sediment material to be used would be the minimum amount necessary to achieve the purpose of the project;</p> <p>d. beneficial uses and water quality of the Bay would be protected; and</p> <p>e. there is a high probability that the project would be successful and not result in unmitigated environmental harm;</p> <p>2. The project includes an adequate monitoring and management plan and has been carefully planned, and the Commission has established measurable performance objectives and controls that would help ensure the success and permanence of the project, and an agency or organization with fish and wildlife management expertise has expressed to the Commission its intention to manage and operate the site for habitat enhancement or restoration purposes for the life of the project;</p> <p>3. The project would use only clean sediment material suitable for aquatic disposal and the Commission has solicited the advice of the San Francisco Bay Regional Water Quality Control Board, the Dredged Material Management Office and other appropriate agencies on the suitability of the dredged sediment material;</p> <p>4. The project would not result in a net loss of Bay or certain waterway surface area or volume. Any offsetting fill removal would be at or near as feasible to the habitat fill site;</p> <p>5. Dredged sediment material would not be placed in areas with particularly high or rare existing natural resource values, such as eelgrass beds and tidal marsh and mudflats, unless the material would be needed to protect or enhance the habitat. The habitat project would not, by itself or cumulatively with other projects, significantly decrease the overall amount of any particular habitat within the Suisun, North, South, or Central Bays, excluding areas that have been recently dredged;</p>	

Dredging	
Draft Policy Changes	Staff Analysis
<p>6. The Commission has consulted with the California Department of Fish and <u>Wildlife Game</u>, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service to ensure that at least one of these agencies supports the proposed project; and</p> <p>7. <u>The project’s design and goals incorporate the best available science on the use of dredged sediment for habitat projects.</u></p> <p>8. After a reasonable period of monitoring, if either:</p> <ul style="list-style-type: none"> a. the project has not met its goals and measurable objectives, and attempts at remediation have proven unsuccessful, or b. the dredged <u>sediment material</u> is found to have substantial adverse impacts on the natural resources of the Bay, then the dredged <u>sediment material</u> would be removed, unless it is demonstrated by competent environmental studies that removing the material would have a greater adverse effect on the Bay than allowing it to remain, and the site would be returned to the conditions existing immediately preceding placement of the dredged <u>sediment material</u>. 	
<p>11b. To ensure protection of Bay habitats, the Commission should not authorize dredged material disposal projects in the Bay and certain waterways for habitat creation, enhancement or restoration, except for projects using a minor amount of dredged material, until:</p> <ul style="list-style-type: none"> 1. Objective and scientific studies have been carried out to evaluate the advisability of disposal of dredged material in the Bay and certain waterways for habitat creation, enhancement and restoration. Those additional studies should address the following: 	<p>Dredging policy 11b was created to ensure that in-Bay use of dredged sediment for habitat projects would be limited until extensive studies were completed and additional policies were adopted. When the Middle Harbor Enhancement Project was proposed, there was concern that in-Bay disposal of large volumes of dredged sediment purportedly for restoration would become a common occurrence. In-Bay disposal of dredged sediment near a dredge site is generally cheaper and more time-efficient than disposal at designated sites in the Bay or offshore. The conditions of Dredging policy 11b were written with this consideration in mind, and attempted to safeguard against dredged sediment disposal for convenience without habitat restoration, enhancement, or creation</p>

Dredging	
Draft Policy Changes	Staff Analysis
<p>a. The Baywide need for in Bay habitat creation, enhancement and restoration, in the context of maintaining appropriate amounts of all habitat types within the Bay, especially for support and recovery of endangered species; and</p> <p>b. The need to use dredged materials to improve Bay habitat, the appropriate characteristics of locations in the Bay for such projects, and the potential short-term and cumulative impacts of such projects; and</p> <p>2. The Commission has adopted additional Baywide policies governing disposal of dredged material in the Bay and certain waterways for the creation, enhancement and restoration of Bay habitat, which narratively establish the necessary biological, hydrological, physical and locational characteristics of candidate sites; and</p> <p>3. The Oakland Middle Harbor enhancement project, if undertaken, is completed successfully.</p>	<p>as the primary goals. The policy is well-justified in this goal, but some of its language and conditions limit projects that genuinely need sediment to restore habitat as their primary goal.</p> <p>Regarding policies that limit the use of fill in the Bay for habitat projects to a “minor amount,” there is a broad consensus that dredged sediment will be needed at habitat sites in tidal waters in significant volumes to adapt to rising seas. The McAteer-Petris Act safeguards against the use of more than the minimum amount of fill necessary for the successful completion of a project. Thus, removing Dredging Policy 11b would allow use of dredged sediment in tidal waters, but not more than the minimum amount necessary for the project purpose .</p> <p>Condition 1 of this policy has been partially addressed as there is a better understanding now of the need for beneficial reuse of sediment and where such projects are most appropriate than when the policy was written. However, it still outlines worthy goals. Aspects of condition 2 are still useful, as it would be beneficial to improve our understanding of ideal site conditions for the beneficial reuse of sediment for habitat goals. The level of detail in this policy may be better accomplished through a guidance document rather than the Bay Plan, or could be captured by simply by referring to the use of the best available science on these matters. To maintain the research goals of Conditions 1 and 2, these conditions have been slightly modified and moved to a new version of Dredging policy 11b (below).</p> <p>Condition 3 requires that the Middle Harbor Enhancement project is completed successfully before more than a minor amount of dredged sediment can be used for habitat projects in the Bay. While caution is certainly still warranted for any project that places large volumes of fill in the Bay, the success of Middle Harbor is not an accurate proxy for the potential success of every other habitat project in the Bay that uses dredged sediment. Thus, it is imprudent to limit the options of all other projects based on this one very specific type of project. However, this policy did serve</p>

Dredging	
Draft Policy Changes	Staff Analysis
	<p>two essential functions that are still important to maintain in the Bay Plan in some capacity:</p> <p>1) Dredging policy 11b limits the amount of sediment that can be placed in deep water for habitat projects. In a sediment-limited system, it is important for sediment to be placed in the areas where it is the most needed for sea level rise adaptation—restoration projects in the margins of the Bay. Additionally, our scientific understanding of deep subtidal areas is not sufficient to fully understand the consequences of placing large volumes of sediment in these areas. This policy function is accomplished by the new Fish, Other Aquatic Organisms, and Wildlife policy 8.</p> <p>2) Dredging Policy 11b indirectly encourages the completion of the Middle Harbor Enhancement Project. However, area-specific policies and goals are addressed as policy notes in the Bay Plan Maps. Thus, staff recommends adding a new policy note to Bay Plan Map 4 to require that the Middle Harbor Enhancement Area provide the habitat benefits that were intended. However, the Brief Descriptive Notice for this Bay Plan Amendment (BPA 1-17) did not include Bay Plan Map 4 as a section of the Bay Plan to be considered for amendment. In order maintain the current schedule of BPA 1-17 (which would be delayed if a new section were added for consideration in BPA 1-17 at this stage), BCDC staff will recommend initiation of a new Bay Plan Amendment 4-19. This initiation is tentatively scheduled for the Commission Meeting on June 6, which would include the Plan Map policy notes. The public hearing on BPA 4-19 would be tentatively scheduled for July 18, 2019.</p>

Dredging

Draft Policy Changes	Staff Analysis
<p><u>11b. The Commission should encourage research and well-designed pilot projects to evaluate the feasibility of the beneficial reuse of dredged sediment in the Bay and certain waterways for habitat creation, enhancement and restoration. Studies should address:</u></p> <ol style="list-style-type: none"> 1. <u>The need to use dredged sediment for in-Bay habitat creation, enhancement and restoration in the context of maintaining appropriate amounts of all habitat types within the Bay, especially for support and recovery of endangered species;</u> 2. <u>The appropriate biological, hydrological, and physical characteristics of locations in the Bay for such projects;</u> 3. <u>The potential of direct, indirect and cumulative impacts of such projects; and</u> 4. <u>The effectiveness of different dredged sediment placement strategies for habitat restoration, enhancement, and creation.</u> 	<p>While the body of research on beneficial reuse of dredged sediment for habitat projects has been growing, this is an important topic which should be investigated more thoroughly for the San Francisco Bay Area. A better understanding of the topics outlined in this policy could enhance BCDC's ability to permit these projects efficiently and to ensure that projects will provide net benefits to the Bay.</p>

Shoreline Protection. The staff preliminarily recommends the Commission revise the findings and policies in the “Shoreline Protection” policy section as shown in the draft language below.

Shoreline Protection	
Draft Findings Changes	Staff Analysis
<p>f. <u>Shoreline protection solutions vary along a spectrum from hardened (grey) structures to natural (green) solutions. Nonstructural Natural and nature-based shoreline protection methods, such as tidal marshes, levees with transitional ecotone habitat, oyster reefs, mudflats, and beaches can provide effective flood protection control and/or wave attenuation when sited properly.</u> In some instances, it may be possible to combine <u>natural and nature-based methods (e.g. habitat restoration, enhancement or protection)</u> with structural approaches to provide protection from flooding and control shoreline erosion, thereby minimizing the shoreline protection project's impact on natural resources, <u>and maximizing other ecological benefits.</u> <u>The appropriate solutions and combinations of solutions depend on physical and biological characteristics of the site, in addition to other factors.</u></p>	<p>This finding is updated to acknowledge that other habitats besides marshes can also provide important shoreline protection benefits, and that shoreline protection approaches realistically fall on a spectrum of hardened (grey) to natural/nature-based (green). The importance of considering site-specific factors to determine project suitability is also added.</p>
<p>g. Loose dirt, concrete slabs, asphalt, bricks, scrap <u>lumber wood</u> 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.</p>	<p>This finding was changed to clarify that scrap wood is really intended to mean scrap lumber, as woody material such as tree branches/trunks may be a part of living shoreline projects.</p>

Shoreline Protection

Draft Findings Changes	Staff Analysis
<p><u>h. In some cases, natural solutions that support wildlife may conflict with adjacent land uses, such as aviation operations.</u></p>	<p>Certain natural and nature-based features for shoreline protection may not be appropriate in some areas if the feature does not provide protection that is consistent with the adjacent land use, or if the feature attracts wildlife that could pose a high risk to human life or property by interference with adjacent land uses. This is primarily of concern when tidal marshes or tidal flats, which both attract numerous species of birds, are located near airports. Birds collisions with aircraft present a significant safety risk to airport operations.</p>
<p><u>i. The use of natural and nature-based features provides additional benefits beyond shoreline protection, including habitat, water quality improvement, carbon sequestration, recreation, and more. Because these benefits are provided, natural and nature-based shoreline protection approaches are sometimes considered self-mitigating.</u></p>	<p>This finding is added to acknowledge the other ecosystem benefits provided by natural and nature-based features, beyond shoreline protection, and to highlight that provision of these benefits can make projects self-mitigating.</p>

Draft Policy Changes	Staff Analysis
<p>1. New shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if: (a) the project is necessary to 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, <u>and the causes and conditions of erosion and flooding conditions</u> at the site; (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.</p>	<p>Language is added to this policy to require that not only the erosion and flooding conditions at the site, but the causes of those conditions, are considered in determining whether a shoreline protection project should be authorized. It is important to identify the cause of erosion and/or flooding, and take appropriate measures to address the problem at its source, and use shoreline protection measures that target the issue if it cannot be addressed at the source.</p>

Shoreline Protection

Draft Policy Changes	Staff Analysis
<p>4. Whenever feasible and appropriate <u>All shoreline protection projects should evaluate the use of include provisions for nonstructural methods natural and nature-based features such as marsh vegetation, levees with transitional ecotone habitat, mudflats, beaches, and oyster reefs, and should incorporate these features to the greatest extent practicable. Ecosystem benefits, including habitat and water quality improvement, should be considered in determining the amount of fill necessary for the project purpose. Suitability and sustainability of proposed shoreline protection and restoration strategies at the project site should be determined using the best available science on shoreline adaptation and restoration. Airports may be exempt from incorporating certain natural and nature-based features 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 protection projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever feasible.</u></p>	<p>This policy has been modified to strengthen the requirement that all projects evaluate and include natural and nature-based features to the greatest extent practicable, and includes new language to address the most recent science on natural and nature-based features. A specific potential exemption is added for airports, because of the high risks to human life and property posed by potential collision of airplanes with birds (which are attracted by certain natural and nature-based features).</p>
<p>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. <u>Shoreline protection projects that include natural and nature-based features may be self-mitigating or require less mitigation than projects that do not include any natural or nature-based features.</u></p>	<p>Language is added to this policy to acknowledge that the use of natural and nature-based features provide ecological benefits that hard structures such as traditional seawalls do not. As a result, these benefits should be considered when evaluating the need for mitigation for the project and as an incentive to use natural and nature based features.</p>
<p><u>6. The Commission should encourage pilot and demonstration projects to research and demonstrate the benefits of incorporating natural and nature-based techniques in San Francisco Bay.</u></p>	<p>Many natural and nature-based features, including hybrid techniques that blend natural features with hardened, structural features, have not been tested for shoreline protection in the region, and it is thus difficult to assess their effectiveness or appropriateness for given sites and situations. A formal statement of the Commission's support and encouragement of pilot projects could help to advance research and understanding on these approaches.</p>

Bay Plan Map 4. The staff preliminarily recommends the Commission revise the findings and policies in the “Bay Plan Map 4” policy section as shown in the draft language below.

Bay Plan Map 4	
Draft Policy Change	Staff Analysis
<p><u>21. Middle Harbor Enhancement Area – The US Army Corps of Engineers and the Port of Oakland should provide habitat benefits described in the performance criteria of the MHEA Construction Period and Long-Term Monitoring, Maintenance, and Adaptive Management Program, and provide habitat benefits to sufficiently account for the delay in project completion. Complete work as quickly as possible to provide habitat benefits that have been long-delayed.</u></p>	<p>Dredging Policy 11b indirectly encourages the completion of the Middle Harbor Enhancement Project. However, area-specific policies and goals are typically addressed as policy notes in the Bay Plan Maps. The "Bay Plan Policies" listed opposite each corresponding Bay Plan map are enforceable policies and have the same authority as the policies in the text of the Bay Plan. This is the most appropriate setting for a project implementation policy at a specific location. This policy is included to continue to encourage that intended benefits of the Middle Harbor Enhancement Project are provided</p> <p>**NOTE: The brief Descriptive Notice for this Bay Plan Amendment (BPA 1-17) did not include Bay Plan Map 4 as a section of the Bay Plan to be considered for amendment. In order maintain the current schedule of BPA 1-17 (which would be delayed if a new section were added for consideration in BPA 1-17), BCDC staff will recommend initiation of a new Bay Plan Amendment 4-19. This initiation is tentatively scheduled for the Commission Meeting on June 6, which would include the Plan Map policy notes. The public hearing on BPA 4-19 would be tentatively scheduled for July 18, 2019.</p>

Amendment Consistency with the McAteer-Petris Act

The McAteer-Petris Act § 66652 requires that amendments of the Bay Plan be consistent with the Findings and Declarations of Policy in the McAteer-Petris Act. The relevant Findings and Declarations of Policy sections of the McAteer-Petris Act are, Section 66600 regarding the Declaration of Public Interest; § 66601 regarding the threat of Uncoordinated, Haphazard Filling; and § 66605 regarding fill in the Bay.

§ 66600 of the McAteer Petris Act states, in part, that “the bay operates as a delicate physical mechanism in which changes that affect one part of the bay may also affect all other parts”, and that it is in the public interest to create a “process by which the San Francisco Bay and its shoreline can be analyzed, planned, and regulated as a unit.” The proposed amendment incorporates policy language on the importance of considering the regional context (e.g. adherence to regional habitat goals) of fill for habitat projects, which will enhance the ability to regulate, analyze, and plan the Bay as a unit. The proposed amendment also adds requirements to consider the impacts of fill for habitat projects, especially those that convert one type of habitat to another, at the sub-regional and regional level, which is in consistent with the finding that changes in one part of the Bay may also affect other parts.

The McAteer Petris Act § 66601 finds, in part, that “a governmental mechanism must exist for evaluating individual projects as to their effect on the entire bay” and that “piecemeal filling of the bay may place serious restrictions on navigation in the bay, may destroy the irreplaceable feeding and breeding grounds of fish and wildlife in the bay, may adversely affect the quality of bay waters and even the quality of air in the bay area, and would therefore be harmful to the needs of the present and future population of the bay region.” By including more language to encourage adherence to regional frameworks and consideration of regionwide impacts of fill for habitat projects, the proposed amendment is consistent with the finding that projects should be evaluated in terms of their impacts on the entire Bay.

The McAteer-Petris Act § 66605 states, in part, that “(a) the public benefits from fill must clearly exceed the public detriment from the loss of water areas, and fill should be limited to water oriented uses, such as wildlife refuges; (b) no alternative upland location exists for the fill; (c) that the water area authorized to be filled should be the minimum necessary to achieve the purpose of the fill; (d) the nature, location, and extent of fill should minimize harmful effects to the Bay including the water volume, circulation, and quality, fish and wildlife resources, and marsh fertility.” The proposed amendment adds language stating a preference for restoring diked historic baylands in accord with the regional consensus on the Bay ecosystem needs, which provides a public benefit, consistent with McAteer-Petris Act § 66605(a). All of the projects addressed through this amendment are water-oriented uses as they support habitats in the Commission’s jurisdiction. Further, the projects addressed through the amendment are consistent with § 66605(b) as the fill necessarily has to be placed in these areas. Although the proposed amendment removes the “minor amount” restrictions on fill that can be allowed in the Bay for habitat projects, projects permitted with the new policy changes must still adhere to the law that states the fill authorized should not be more than “the minimum necessary to achieve the purpose of the fill,” and thus the amendment is consistent with § 66605(c). Finally, although the proposed amendment will allow more than a minor amount of fill in

the Bay for habitat projects, Bay Plan laws and policies providing habitat and wildlife protection are still in place. Additionally, the proposed amendment adds additional policy provisions where necessary to ensure authorized projects would minimize the risk of harmful effects to the Bay, including significantly altering the balance of species or habitats. Therefore, the proposed amendment is also consistent with § 66605(d).

Environmental Assessment

BCDC's planning and permitting programs under the McAteer-Petris Act are, as a result of having been certified as a Certified State Regulatory Program pursuant to section 21080.5 of the California Environmental Quality Act (CEQA) and CEQA Guidelines section 15251(h) (14 CCR § 15251(h)), exempt from the CEQA requirements to prepare an environmental impact report (EIR), mitigated negative declaration, negative declaration, or initial study. Instead, BCDC's regulations provide for preparation an Environmental Assessment, which is considered the "functional equivalent" of an EIR (14 CCR §11521). An Environmental Assessment is required to be part of the staff planning report prepared and distributed prior to amending the Bay Plan. The Environmental Assessment must either: (1) state that the proposed amendment will have no significant adverse environmental impacts; or (2) describe the significant adverse environmental effects, the public benefits of the proposed amendments, any feasible mitigation measures that would lessen the significant adverse environmental impacts, and any feasible alternatives (*Id.*). Because the proposed amendment is a programmatic policy change, rather than a specific project with more quantifiable impacts, the discussion in this Environmental Assessment is more general than an Environmental Assessment for a specific project.

The proposed amendments are intended to mitigate the adverse impacts of rising sea level on Bay habitats and therefore the future impacts from the proposed policies should be beneficial. While the background report indicates that projects with significant fill could be authorized under the amended policies and that they may have inadvertent adverse impacts on the Bay, the Bay Plan amendments themselves will have limited environmental effects because BCDC's existing laws and policies prevent significant environmental impacts within the scope of its jurisdiction and authority. The proposed amendment to the Bay Plan would not affect the Commission's ability to require specific environmental review of projects proposed in its jurisdiction under the provisions of the McAteer-Petris Act, the Bay Plan, CEQA, and the Commission's federally approved management program for the San Francisco Bay. Additionally, the Bay Plan amendments themselves do not have significant adverse environmental effects. The projects approved by the Commission, consistent with the Bay Plan policies, could potentially have adverse environmental effects, but any discussion of whether particular future projects reviewed by BCDC would result in different impacts under the proposed amendments as compared to existing policies would be highly speculative.

To address the speculative consideration of environmental impacts of hypothetical projects potentially permissible under this amendment, the CEQA Checklist of environmental factors potentially affected (CEQA Guidelines (14 CCR §15000 *et seq.*) App. G) was assessed. Factors that could be reasonably assumed to be affected by habitat restoration projects that place fill in tidal waters are biological resources, hydrology/water quality, geology/soils, aesthetics, and noise. Impacts on noise would both be temporary, and likely be intermittent and last only for the duration of the construction period. These considerations are the same or similar to those impacts associated with currently permitted habitat projects. It is possible that this amendment's allowance of larger volumes of Bay fill could permit larger projects that result in longer or intensified impacts on

restoration noise level. Various types of habitat projects with fill may have impacts on biological resources, hydrology/water quality, geology/soils, and aesthetics. Hypothetical impacts of these projects and the impact mechanisms are detailed in the Background Report Chapters 6 and 7. While considering hypothetical impacts of these projects is necessary and important, review of individual projects in comparison to the Commission's laws and policies still require protection of Bay wildlife and natural habitats, minimization of harmful impacts to the Bay, and mitigation for unavoidable impacts. Taken together, the hypothetical review and project specific review would either not allow the project, change the project such that environmental impacts are reduced through minimization measures and/or mitigation requirements, or that a finding of overriding considerations is made.

The McAteer Petris Act¹⁰ protects Bay habitats and organisms by stating:

(a) That further filling of San Francisco Bay and certain waterways specified in subdivision (e) of § 66610 should be authorized only when public benefits from fill clearly exceed public detriment from the loss of the water areas and should be limited to water-oriented uses (such as ports, water-related industry, airports, bridges, wildlife refuges, water-oriented recreation, and public assembly, water intake and discharge lines for desalinization plants and power generating plants requiring large amounts of water for cooling purposes) or minor fill for improving shoreline appearance or public access to the bay;

(c) That the water area authorized to be filled should be the minimum necessary to achieve the purpose of the fill;

(d) That the nature, location, and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume surface area or circulation of water, water quality, fertility of marshes or fish or wildlife resources, or other conditions impacting the environment, as defined in Section 21060.5 of the Public Resources Code;

The Bay Plan also continues to protect Bay habitats and organisms through the following policies:

- Fish, Other Aquatic Organisms, and Wildlife Policy 1: To assure the benefits of fish, other aquatic organisms and wildlife for future generations, to the greatest extent feasible, the Bay's tidal marshes, tidal flats, and subtidal habitat should be conserved, restored and increased.
- Fish, Other Aquatic Organisms, and Wildlife Policy 2: Specific habitats that are needed to conserve, increase or prevent the extinction of any native species, species threatened or endangered, species that the California Department of Fish and Game has determined are candidates for listing as endangered or threatened under the California Endangered Species Act, or any species that provides substantial public benefits, should be protected, whether in the Bay or behind dikes.
- Tidal Marshes and Tidal Flats Policy 1: Tidal marshes and tidal flats should be conserved to the fullest possible extent. Filling, diking, and dredging projects that would substantially harm tidal marshes or tidal flats should be allowed only for purposes that provide substantial public benefits and only if there is no feasible alternative.

¹⁰ § 66605: Findings and Declarations as to Benefits, Purposes, and Manner of Filling

- Tidal Marshes and Tidal Flats Policy 2: Any proposed fill, diking, or dredging project should be thoroughly evaluated to determine the effect of the project on tidal marshes and tidal flats, and designed to minimize, and if feasible, avoid any harmful effects.

Many habitat restoration, enhancement, or creation projects authorized by BCDC have been considered self-mitigating because they provide greater benefits to the Bay ecosystem overall than detriment by impacting habitat or habitat type conversion. For example, Hamilton Wetlands Restoration Project (C2005.007.00), Sonoma Baylands Wetland Restoration Project (M1991.061.00), the South Bay Salt Ponds Restoration Project (C2017.008.00), and the Sonoma Creek Enhancement Project (C2014.004.00) were considered self-mitigating due to the benefits provided by the project outweighing the limited impacts. The proposed amendments also include policy language additions and modifications that support the minimization of impacts that could be caused by larger volumes of fill in the Bay (listed in the table above, and justified in Background Report Chapters 6, 7, and 8). Also, in considering potential impacts of projects that may be permitted as a result of this amendment, it is important frame the impacts of the adaptation measures against the impacts of not allowing fill to address sea level rise.

Notwithstanding these considerations, the allowance of more fill in habitat projects may result in impacts and habitat type conversion that may require mitigation on an individual project basis. In cases where mitigation is necessary, it would ensure that the overall impacts of the project were reduced to an appropriate level. If mitigation is necessary, existing BCDC mitigation policies provide for the Commission to require appropriate mitigation:

- Mitigation Policy 1: Projects should be designed to avoid adverse environmental impacts to Bay natural resources such as to water surface area, volume, or circulation and to plants, fish, other aquatic organisms and wildlife habitat, subtidal areas, or tidal marshes or tidal flats. Whenever adverse impacts cannot be avoided, they should be minimized to the greatest extent practicable. Finally, measures to compensate for unavoidable adverse impacts to the natural resources of the Bay should be required. Mitigation is not a substitute for meeting the other requirements of the McAteer-Petris Act.

Ultimately, the projects that could be permitted through the proposed amended policies may have some environmental impacts, which would be assessed, and if necessary, mitigated for through the permitting process. However, the Bay Plan amendments themselves will not have any significant environmental effects. For all the foregoing reasons, the Commission's adoption of the proposed amendments to the Bay Plan will have no clearly identifiable significant adverse effects on the environment.

Summary of Written Comments and Summary of Responses to All Significant Environmental Points Raised¹¹

On the day of the Commission's vote to initiate the Fill for Habitat Bay Plan Amendment (July 20, 2017), BCDC received three written comment letters:

¹¹ As required by 14 CCR §11003(b)(7) and (b)(8)

1. **Bay Area Council.** The letter from the Bay Area Council offered support of the BCDC amendment process, and urged the Commission to consider the urgency of climate-related threats in their execution of the amendment. The letter highlighted the potential damages that sea level rise could cause to both the built environment and natural habitats, and noted the importance of working quickly and efficiently to restore Bay habitats. The comment concluded that reduction of project timelines and costs must be the paramount goal of considered Bay Plan changes, and that BCDC should be nimble and innovative in their policy updates.

The Bay Area Council raised a significant environmental point that sea level rise is a major threat to habitat sustainability in the region, and that wetlands must be restored to a self-sustaining state by 2030. BCDC recognizes this urgency to restore habitat projects quickly, which is why policy updates will allow more Bay fill for habitat projects in the Bay. Some policies will be added that could slightly increase project costs (via either monitoring or adaptive management plans), but these policies are important to assess the performance of innovative sea level rise adaptation work and to detect any unexpected negative impacts on the Bay's wildlife and ecosystems as a result of this adaptation work.

2. **Arthur Feinstein.** Arthur Feinstein expressed his strong support of the Fill for Habitat Bay Plan amendment. He also noted that nuanced discussion of the issues would undoubtedly raise questions, and he expressed his hope that the public would be adequately brought into discussions related to the amendment. No significant environmental points were raised.

3. **Ducks Unlimited.** Ducks Unlimited offered their support of the BCDC Bay Plan amendment to address Fill for Habitat projects. They noted the potential of the amendment to facilitate wetland restoration and enhancement, and underscored the importance of wetlands in providing numerous ecosystem services. The comments echoed those of the Bay Area Council in highlighting the urgency of meeting wetland restoration goals before sea level rise progresses too far, and describing the need to reduce regulatory hurdles that these projects must overcome if this work is to be completed quickly and efficiently. Four actions were recommended to achieve these goals:

- Reduce the compliance burden on projects
- Create exemptions or other pathways to expedite restoration projects with overwhelming net benefits
- Defer to restoration project proponents to balance project goals and objectives with opportunities for public access
- Consider incorporating language that encourages projects to pursue maximum habitat restoration as quickly as possible, instead of restricting fill for habitat projects.

The letter then notes that wetland restoration projects are highly coordinated and planned for maximum societal and environmental benefits, and thus should not be characterized as "indiscriminate Bay fill". Ducks Unlimited concludes by urging the Commission to develop policy updates that reduce the compliance burden rather than add more regulation and oversight.

Ducks Unlimited raised the same significant environmental point as the Bay Area Council—that sea level rise is a major threat to habitat sustainability in the region, and that wetlands must be restored to a self-sustaining state by 2030. Without significant policy streamlining, they argue that accomplishing these goals will not be possible. BCDC recognizes this urgency to restore wetland habitats quickly, which is why policy updates will allow more Bay fill for habitat projects in the Bay.

Some policies will be added that could slightly increase project costs or burden (via either monitoring or adaptive management plans), but these policies are important to assess the performance of innovative sea level rise adaptation work and to detect any unexpected negative impacts on the Bay's wildlife and ecosystems as a result of this adaptation work.

In addition to the three letters summarized above, the Commission received one written comment letter from Save the Bay on November 15, 2018, the day that BCDC staff presented to the Commission on a revision of the initial public hearing date for the Fill for Habitat Bay Plan Amendment:

4. **Save the Bay.** The letter from Save the Bay expresses their disappointment in BCDC's decision to postpone the initial public hearing date for the Fill for Habitat Bay Plan Amendment from November 15, 2018 to June 20, 2019. They note the extensive stakeholder engagement that had already been involved in the decision to amend the Bay Plan, and urge the Commission to take immediate action on the Fill for Habitat Amendment. The letter notes the urgency of the amendment in light of climate change, then calls for the Commission to hold the initial public hearing on the amendment within two months of the letter's mailing date, rather than within eight months, as was decided by BCDC on November 2, 2018.

Correspondence from Save the Bay raises the significant environmental point that climate change requires urgent action to make Bay habitats more resilient before major changes progress. BCDC recognizes this urgency and has thus accelerated its amendment process to the greatest extent possible. A decision to hold a public hearing within two months of November 15 (as proposed by Save the Bay), rather than within eight months of that date (as BCDC will actually adhere to), would likely have made little difference in preparing the Bay for environmental impacts caused by climate change.

Appendices

Appendix A: Stakeholder Interviews and Engagement

1. Interviews and meetings arranged by BCDC staff to discuss topics related to the Fill for Habitat Amendment:

Organization/Agency	Participants
California Department of Fish and Wildlife	Karen Weiss, Arn Aarreberg
California State Coastal Conservancy	Matt Gerhart, Brenda Buxton, Jessica Davenport, Kelly Malinowski, Marilyn Latta
Citizens' Committee to Complete the Refuge	Arthur Feinstein
Ellen Johnck Consulting	Ellen Johnck
Environmental Science Associates	John Bourgeois
Environmental Science Associates	Michelle Orr
Golden Gate Audubon	Cindy Margulis
N/A	Phyllis Faber
National Marine Fisheries Service	Sara Azat

Organization/Agency	Participants
Regional Water Quality Control Board - Region 2 - Planning Staff	Thomas Mumley, Kevin Lunde, Christina Toms, Lisa McCann
Regional Water Quality Control Board - Region 2 - Regulatory Staff	Xavier Fernandez, Keith Lichten, Elizabeth Morrison, Agnes Farres, Christina Toms
San Francisco Bay Trail	Lee Huo
San Francisco Estuary Institute	Letitia Grenier, Julie Beagle, Jeremy Lowe, Katie McKnight
San Francisco State University	Katharyn Boyer
Save the Bay	David Lewis
Sustainable Conservation	Erika Lovejoy; Stephanie Falzone
United States Army Corps of Engineers	Elizabeth Murray
United States Environmental Protection Agency	Jennifer Siu
United States Fish and Wildlife Service	Anne Morkill
United States Fish and Wildlife Service / Audubon California	Don Brubaker, Julia Kelly
Wetlands Regional Monitoring Program	Heidi Nutters, Ian Kelmartin

2. Workshops, conferences, and meetings attended by BCDC staff to learn about and engage on issues related to the Fill for Habitat Amendment:

Meeting Name	Date	Agency/Organization	Presentation Given?
Bay Delta Science Conference	8/11/18	N/A	Yes
Implementation Committee	8/22/18	San Francisco Estuary Partnership	Yes
Engineering With Nature Symposium	9/20/18	US Army Corps of Engineers	No
Middle Harbor Enhancement Area Technical Advisory Committee Meeting	10/3/18	US Army Corps of Engineers	No
Conservation Delivery Committee Meeting	10/16/18	San Francisco Bay Joint Venture	No
Management Board Meeting	10/30/18	San Francisco Bay Joint Venture	Yes

Meeting Name	Date	Agency/Organization	Presentation Given?
Beneficial Reuse Workshop	11/7/18	Bay Planning Coalition	No
Restore America's Estuaries Summit	12/11/18	Restore America's Estuaries	Yes
Living Shorelines in the Bay Workshop	3/1/19	California State Coastal Conservancy	No
Wildlife Monitoring Workshop	4/4/19	San Francisco Bay Joint Venture	No
BCDC Design Review Board Meeting	4/8/19	BCDC Design Review Board	Yes
Bay Restoration Regulatory Policy and Management Team Meeting	4/12/19	Bay Restoration Regulatory Policy and Management Team	Yes

Appendix B: Science Briefings

Staff organized a series of three science briefings for the Commission as part of the development of Bay Plan amendment 1-17. Briefings presented technical and scientific information to explain various issues surrounding the history and progress of our current understanding of restoration project design, various types of fill, and the potential impacts of fill.

1. **Roger Leventhal (02/07/19)**. Roger Leventhal (a Senior Engineer for Marin County) presented on the range of fill types that have constituted “fill for habitat”. He summarized types and approaches to fill for habitat restoration and habitat resilience that have occurred in the past, often at smaller scales or behind levees and thus not in the Bay jurisdiction. Examples included fill for subtidal areas, fill for Bay beaches, fill for marsh augmentation, fill for marsh creation, and fill to create horizontal levees or transition zones. The talk then concluded with a list of “known unknowns”, or information that will be important to learn as we experiment with novel approaches to fill in the Bay, and a note on the importance of using pilot or experimental projects to answer some of these unknowns.

The complete talk can be found under [February 7, 2019 Commission Meeting Agenda Item 8](#)

2. **Michelle Orr (02/21/19)**. Michelle Orr (Wetlands and Estuaries director at Environmental Science Associates) presented a brief history of restoration in the Bay over the past 40+ years, and described lessons learned as wetland restoration design progressed. She described the three “eras” of habitat restoration, each characterized by different understanding, approaches, and challenges. The first era was characterized by restoration projects that attempted to re-create a complete, mature marsh at first pass. The example provided was Muzzi Marsh. By the second era of restoration, project engineers had realized that slightly under-filling restoration sites and allowing natural channel development and re-vegetation resulted in healthier, more natural marshes, as was

the case at Sonoma Baylands. The third era was characterized by restoring “complete” tidal marshes, with upland transition zones and associated subtidal assemblages. The challenges of climate change and sediment shortage are also prominent for third generation projects.

The complete talk can be found under Agenda Item 11 at:

<http://www.bcdc.ca.gov/cm/2019/0221Agenda.html>

3. Tradeoffs Panel (03/07/19). A panel was organized to provide an overview of the biological and physical processes that must be considered when placing large volumes of fill in the Bay, and to consider the potential impacts that could be associated with allowing this fill. Panelists were selected to provide a range of perspectives on this issue.

- Jeremy Lowe (a coastal geomorphologist at the San Francisco Estuary Institute) presented on the topic from a sediment needs and placement perspective. He addressed three key needs for sediment in restoration projects. The first need was to maintain existing marshes, for which he addressed three potential placement strategies and the issues associated with prioritization of which marshes to maintain and how to consider impacts of sediment placement. The second need was to restore complete tidal marshes by creating upland transition zones, and questions raised were how to decide where horizontal levees make sense, and how to balance multiple restoration objectives. The third need was to restore/manage disconnected low-lying areas. Questions to consider included how these areas should be maintained and/or restored considering sea level rise.
- Dr. Katharyn Boyer (a Professor of Biology at San Francisco State University’s Estuary and Ocean Science Center) presented on the topic from a subtidal habitat perspective. She reviewed various approaches to and organisms used for subtidal habitat restoration in the Bay, with a focus on habitat-forming species of oyster and eelgrass. She described the habitat and shoreline protection benefits of these projects, and the synergies that have been observed in pilot subtidal area restoration projects. She concluded that Bay Fill will be necessary to preserve habitat value into the future, and that fill could be done in a careful way to avoid sensitive habitats. Additionally, she noted that projects adding subtidal habitat complexity are important because they are much rarer compared to mudflat/sandflat habitat, and thus it is important to scale this work up quickly.
- Isa Woo (a Biologist with USGS Western Ecological Research Center) presented on the topic from a wildlife perspective. She gave a brief overview of wetland ecology and discussed some of the potential impacts that climate change could have on wetland wildlife. She presented a case study of how climate change would impact foraging habitat availability for small shorebirds on mudflats at 2 different locations, demonstrating that impacts may be quite variable and location dependent. Sediment augmentation techniques that could reduce these losses were briefly described, although it was noted that these techniques have some uncertainty surrounding their success and impacts as well.

Talks can be found under [March 7, 2019 Commission Meeting Agenda Item 13](#)

Appendix C: Workshop Summary and Feedback on Fill for Habitat Amendment Policy Options

A Commission workshop on the Fill for Habitat Bay Plan Amendment was held on March 21, 2019. The workshop was open to the public. The workshop allowed BCDC Commissioners and other stakeholders to examine and provide feedback on potential options for policy changes to the Bay Plan that would address the issue of Bay fill restrictions. Other options to address the issue outside of a Bay Plan amendment were raised for discussion as well. The policy options were presented in a series of posters on topics related to the Fill for Habitat amendment, and this document summarizes the feedback received at each poster.

1. Limited Amount of Fill Allowed for Restoration Projects

- **Policy Challenge:** BCDC was founded on the core principle of reducing *uncontrolled* filling of the Bay, but sea level rise now threatens to drown habitats over time. Because Bay Fill has impacts on Bay habitats, previous policy¹² has limited the amount of Bay Fill that can be placed in habitats, even for habitat improvement projects including habitat restoration, enhancement, or creation. With sea level rise, more fill may be necessary to save habitats from drowning, and to make habitats more resilient and adaptable to sea level rise. These projects may require large volumes of fill for sea level rise adaptation that would be hard to define as “minor.”
- **Policy Options: Bay Plan Amendments**
 1. Remove “minor amount of fill” language, and rely on the language in the McAteer Petris Act.
 - Pros: By requiring the “minimum amount of fill necessary” for a project, the McAteer Petris Act already requires that applicants carefully consider fill volume for any project. Currently, fill for habitat projects must satisfy an additional standard of “minor fill.” Removing this additional subjective standard would hold all projects to the same fill volume standard.
 - Cons: Removal could result in much larger volumes of fill in the Bay. The “minimum amount of fill” language in the McAteer-Petris Act still requires applicants for habitat projects to justify the amount of fill.
 2. Replace the language “if no other method of enhancement or restoration except filling is feasible” to reflect the potential need for fill to maximize the benefits of the project
 - Pros: Language specifically addressing the volume of Bay fill allowed for habitat projects could provide better guidance to regulators and applicants
 - Cons: This language may still create additional restrictions or be redundant with the McAteer-Petris Act
 3. Add language to guide determinations for the minimum amount of fill necessary (e.g. settling rate, how compact material will become, habitat and landscape scale considerations).

¹² Bay Plan Policies: Fish, Other Aquatic Organisms, and Wildlife Policy 5; Tidal Marshes and Tidal Flats Policy 8; Subtidal Areas Policy 6

- Pros: It is important to consider physical sediment dynamics and habitat functions in determining the “minimum amount” of fill necessary. Would be helpful in providing guidance to regulators and applicants
 - Cons: In some cases this information may be difficult or more expensive/time consuming for applicants to provide; also, can be considered without adding language
- **Solutions Outside the Bay Plan**
 1. Develop a guidance document on best practices of placing fill in the Bay for habitat restoration, creation, or enhancement.
 - Pros: If larger volumes of Bay fill are permitted, guidance on best practices for fill placement for different purposes would benefit both applicants and permit analysts
 - Cons: The best science on this information may be changing frequently, and the production of such a document may require more resources than are available
- **Workshop Feedback**
 1. Minimum Guidance language (Option 3) doesn’t belong in Bay Plan—there should be a guidance document.
 - Clarify or justify what either “minimum” or “minor” mean, or consider removing reference to amount? Definitions about minimum could be in guidance
 - Shouldn’t we do all options? The group agreed that yes, all options should be undertaken.
 - If we remove “minor”, how do we still address Commission concerns?
 - Concerned about how new fill may allow development in the transition zone (i.e. change in mean high water/BCDC jurisdiction)
 - Sears Point is an example where “minor” limited habitat types that could be created
 - Concerned that fill does not result in uplands that are developable
 - Get creative about how we use sediment (coarse) coming out of channels—permit fill placement over long term
 - Commission can already exert flexibility—maybe we don’t need change (#3)
 - The Bay Plan should reflect Mac Act with “minimum necessary”
 - Like Options 1, 2, and A (an option outside of the Bay Plan amendment)
 - Support Option 1—habitat shouldn’t be held to a more restrictive standard (should be like Mac Act)
 - Other option may include review board for habitat projects...have to pass the “laugh test”

- Consider creating a new staff position to further assess the purpose of proposed projects (i.e. BRRIT)
- Do all options—allow analyst flexibility. There are too many constraints. Time and money is limited. Needs to be consistent with restoration science.
 - How do we determine if a project is “habitat” and not something else? Would that change the amount allowed?
- Guidance could be used to define “habitat project”
 - Pilot projects— use lessons learned to scale up (sticky note)
- Projects that are solely for habitat restoration should be treated differently than multi-benefit projects
 - Can’t remove fill if a project fails, it’s a permanent impact (sticky note)
- Who defines what a habitat or restoration project is—applicant or staff?
- Need mechanisms to streamline permitting. No time to wait! Be bold!
 - In being bold, habitat projects shouldn’t have as much push back as other types of projects.
- Does BCDC do cumulative analysis of impacts outside jurisdiction?
- Guidance about public access conflicts should be created
- Guidance should include criteria that determines how a project is evaluated.
- “True intent”—Guidance shouldn’t be too prescriptive...does guidance become “out of date”? Concern is that having guidance, projects may be designed to fit a checklist, not restore ecology.
- Should encourage multi-benefit projects that maximize functions and values instead of minimum acreage.
- There are very few “true” restoration projects left, meaning this amendment if applied only to non multi-benefit projects, will have little impact.
- Important to understand/emphasize project goals (i.e. importance of establishing complete marsh) to avoid “green washing”
- Set realistic goals around monitoring
- Consider guidance around how to treat/allow “thin-layer placement”, and how projects are phased over time.

2. Using Dredged Sediment for Habitat Projects in Tidal Waters

- **Policy Challenge:** Sea levels are projected to rise significantly in the Bay Area during this century, and sediment will be a critical component for sustaining Bay habitats as sea levels rise. We know that sediment is a precious resource in limited supply, and a large volume of it is dredged every year to maintain safe navigation. BCDC’s current dredging policies regulate in-Bay placement of dredged sediment and promote beneficial reuse of sediment for creating, enhancing, and restoring habitats. However, Dredging Policy 11b

limits the amount of dredged sediment that can be used for habitat projects in Bay waters to a “minor amount” until three conditions are met. The issues are: Are these three conditions still relevant? If so, is it appropriate to limit use of dredged sediment for habitat restoration in tidal waters until these requirements have been fulfilled? Is “minor amount” appropriate or should the language be changed to mirror with the McAteer Petris Act fill tests?

- **Policy Options: Bay Plan Amendments**

1. Note that the successful completion of Middle Harbor is something we should work toward, but not an absolute contingency of using more than a minor amount of dredged sediment in tidally active restoration sites
 - Pros: Modifying subsection 3 of Dredging policy 11b would ensure that the beneficial reuse of much needed sediment for tidally active habitat projects is not restricted by a single project
 - Cons: Only altering subsection 3 means that other elements of the policy still impose restrictions on the beneficial reuse of sediment for tidally active habitat projects
2. Remove Dredging Policy 11b
 - Pros: Removal of this policy would lift a significant restriction on the tidally active habitat projects that would use dredged sediment, while still leaving in place the substantive requirements that beneficial reuse projects must adhere to in Dredging Policy 11a
 - Cons: Deletion would remove direction to develop clear understanding of potential impacts of fill in tidal waters and some important protections for projects proposing to use large volumes of dredged sediment
3. Amend Dredging Policy 11b to be consistent with the McAteer Petris Act's requirement for the minimum amount of fill necessary for the project, and encourage the cautious use of dredged sediment in tidally active projects while continuing to work toward accomplishing conditions 1-3
 - Pros: A modified version of Dredging Policy 11b could further support and encourage the use of dredged sediment for habitat projects that are tidally active wherever possible, but still include restrictions to ensure that this reuse is done with thorough consideration of potential impacts to the Bay and its wildlife
 - Cons: Deletion would remove some important protections from potential impacts of projects proposing to use large volumes of dredged sediment
4. Address this issue through the planned for Beneficial Reuse Bay Plan Amendment
 - Pros: All dredging policies, including those for beneficial reuse of dredged sediment could be addressed comprehensively at one time
 - Cons: This would delay the implementation of updated policies on habitat projects, and a continued restriction on the amount of dredged sediment that could be used in tidally active habitat projects

- **Solutions Outside the Bay Plan**
 - Continue to work toward completing all three of the requirements of Dredging Policy 11b
- **Workshop Feedback**
 - Not just tidal waters—also use material in upland (example Alameda Point)
 - Editorial Note: BCDC can authorize upland material placement under current policies. The restrictions on amount applied through Dredging Policy 11b only apply to tidal waters.
 - Need natural progression/transition
 - Tell cities-make certain amount of land available for transition habitat(?)
 - MHEA: to define success, concentrate on subtidal goals of MHEA, not so much the marsh/beach, etc.
 - What about using upland material?
 - Missing idea: scale – introduce this to give context
 - Jeremy Lowe – 200-300 million cubic yards needed – 6 million in MHEA is peanuts
 - At least modify 11b; do not tie to MHEA. Federal funding delays slowing innovation
 - Redwood City did a big study on this (Ellen Johnck)—use all clean dredged material for habitat.
 - Water Board standards for beneficial reuse set 20 years ago may need to be revisited. Can these standards be relaxed? How much sediment is being turned away?
 - Redwood City—used hose to keep sediment wet per RWQCB requirements.
 - Use conditional use permits? Come with plan, weigh it against current science.
 - This would be a good interim step (Policy 11a already does this)
 - Long-term: have a more prescriptive policy
 - Policy 11b is not needed (this sentiment was echoed by others)
 - Policy 11b sections:
 - 1a) We already know this;
 - 1b) Need to find candidate sites
 - 2) Similar to 1b—just need to find the right candidate places
 - Policy 11b is bad language
 - Sooner or later, have to try it (large volumes of fill in the Bay)
 - Problems with both minor and minimum: need to focus on necessary fill to do the job. “Minimum” is too constraining.
 - Ensure policy coordination with other relevant regulatory agencies
 - Need to work out \$ - how to finance these projects?

- USACE—disposes at cheapest environmentally preferred site—extra money may be needed for certain sites.
- Don't delay
- Other policies will address what 11b requires
- After we do this Bay Fill for habitat amendment, we need a comprehensive amendment/set of policies on dredging and beneficial reuse. Don't want that to slow down the current process – i.e. move forward first with Bay Fill for habitat.
- Don't let perfect be enemy of good

2. Regional Goals / Restoring Complete Ecosystems

- **Policy Challenge:** The most resilient ecosystems are *connected, diverse, and work with* natural processes across the region. But BCDC currently regulates on a project-by-project basis, not holistically across the region. Individual restoration projects will need to work together to restore a complete ecosystem that can be sustained into the future. Research on where habitat restoration and/or nature-based adaptation projects are most suitable has been compiled in various reports, including the *Subtidal Habitat Goals report (2010)*, the *Baylands Ecosystem Habitat Goals Project Update (2015)*, and SFEI/SPUR's *Adaptation Atlas (2019)*. While some of BCDC's current findings and policies recommend working within these frameworks, Bay Plan policies could more clearly recommend or require that projects integrate the recommendations of these reports, to ensure a regional approach to restoration.
- **Policy Options: Bay Plan Amendments**
 1. Add information referencing the principles of *Subtidal Habitat Goals, Baylands Ecosystem Habitat Goals Update, and the Adaptation Atlas*:
 - Pros: This will strengthen BCDC's support of the best available science in the Bay Plan
 - Cons: Specific reference to a current paradigm may limit future work unintentionally. Reference to the "best available science" may be better.
 2. Require information from permit applicants on how the project will fit within regional habitat restoration frameworks and adhere to the principles of these frameworks in their goals, siting, and design:
 - Pros: This will ensure that projects consider regional habitat objectives
 - Cons: This information may be expensive or time-consuming for applicants to provide
 3. Add policies to encourage projects that increase habitat connectivity, both at the project level and the regional level:
 - Pros: Habitat connectivity is essential to ensuring wildlife populations can access the suite of habitats and ecosystem functions they need to thrive
 - Cons: Not every project may have the capacity or need to enhance habitat connectivity (i.e. may still be providing essential habitat without connecting habitats). Also, a comprehensive regional ecosystem adaptation vision has not yet developed.

4. The extent of a project's adherence to regional frameworks, including site suitability, should scale with the size, lifespan, and/or purpose of the project
 - Pros: Some smaller or temporary projects may not need to be sustainable in the long term if their goal is to provide valuable habitat for a finite period of time
 - Cons: It may be difficult to assess what the project's actual life will be and may allow projects to avoid considering adaptation strategies that would promote sustainability.
- **Solutions Outside the Bay Plan**
 - Use of the Bay Restoration Regulatory Integration Team (BRRIT) to assess how projects fit within regional restoration priorities and to consider the impacts of projects together, rather than on a case by case basis
 - Pros: Makes use of a new entity to enhance coordination and adherence to regional visions that align with other regulatory agencies in the Bay Area
 - Cons: BRRIT may not have capacity to do this analysis
 - Amend Bay Plan Maps to add in elements of regional plans and priorities
 - Pros: Provides an additional regulatory tool to ensure that projects are sustainable and well-sited
 - Cons: Details would reflect our current understanding, and could change relatively often as science is advanced
 - **Workshop Feedback**
 - Option 1: Add information referencing the principles of *Subtidal Habitat Goals*, *Baylands Ecosystem Habitat Goals Update*, and the *Adaptation Atlas* Use plans and best available science
 - Create updateable guidance with "Best available science" that can be more flexible to ongoing scientific knowledge and understanding
 - Should reference documents and newer available science –good starting point for permit discussion.
 - Add to guidance document, which is easily updated, instead of policy
 - Evolving from pilot projects, most likely to be referenced for future
 - Lots of different documents available but what is the one plan that the whole region is working towards – what's the regional vision and goals
 - Option 2: Require information from permit applicants on how the project will fit within regional habitat restoration frameworks and adhere to the principles of these frameworks in their goals, siting, and design
 - From permit applicants on how the project will fit within regional habitat restoration frameworks and adhere to the principles of these frameworks in their goals, siting, and design
 - Does not have to be expensive—no new analysis.

- Burden on applicant if required.
- Must be achievable
- Vague and open to interpretation
- Too high of standards—restrictive
- Under current system, Bay Plan maps are the main source of regulatory power
- Find a way to incentivize applicants to achieve higher standards without requiring it for everyone
- Option 3: Add policies to encourage projects that increase habitat connectivity, both at the project level and the regional level
 - Question that leads to discussion instead of regulatory line: how does project fit into regional context?
 - Could be barriers outside of applicants' control
 - At right places and scale
- Option 4: The extent of a project's adherence to regional frameworks, including site suitability, should scale with the size, lifespan, and/or purpose of the project
 - During CEQA process or during permitting?
 - Could be prohibitive
 - Tricky, hard to wrap head around
 - More about incentives
 - Flexibility is good, but there is a danger of low-balling
 - Streamline, expedite implementation → BRRIT
- Expert Board to review/improve applications-- scientific advisory committee like ECRB:
 - Consider rare habitats outside marsh, subtidal
 - Incentivize: prioritize, expedite good, holistic projects
 - No need for a new board: applicants are doing extensive research already
 - Not one process fits all. Some require speedy process, others do not.
 - Funding issue: Measure AA funds based on approval of experts.
 - Monoculture around Bay if every project follows current trend
 - Must include fast-moving practitioners, restoration authority, etc.
 - If only at BCDC, would that alienate others?
 - Problematic at BCDC level, because it's voluntary. Projects occur as land becomes available.
 - Regulatory additions may complicate implementation.
 - Regional plan first?! "Cart before the horse"

- Lead and vision for regional plan missing.
- Not burdensome to require individual projects to consider region—build up data that informs future plan.
- What are the criteria?
- How much choice does owner have vs regional coordination?
- Protocol to at least start thinking about integration/context
- Incentivize (e.g. Measure AA)
- Vision for region exists (e.g. BEHGU)
- Guidance different region by region
- Bay Plan can be seen as promise, less room for projects outside
- Monitoring ends early—need follow-up
- Monitoring criteria, longitudinal studies
- Standardize when a project is done (e.g. time, criteria)
- Flexibility regarding work-windows
- Marry beneficial sediment use with endangered species projects—BRRIT?
- How projects fit into regional context is key
- Goals good, but too hard to achieve? Flexibility is required.
- Should not be used to deny projects, but provide information, and require consideration
- Bay Plan Maps: Update schedule?
 - Updating maps would be helpful
 - What would Bay Plan Map updates look like?
 - Are there priority restoration areas?
 - Maps represent policies—this is concerning, because it may limit approvable projects

3. Pilot Projects/Monitoring/Adaptive Management

- **Policy Challenge:** Sea level rise is occurring and will increase over time. There is uncertainty about how habitats will respond, and the effectiveness of restoration or adaptation strategies that are untested. We have never experienced the rate of sea level rise that is expected within the coming years. Innovative new ways to address these risks will be necessary to sustain habitats. However, many of the methods and approaches restore and maintain habitats that may be proposed include Bay fill and remain experimental. Pilot/demonstration projects should also be encouraged to test novel and innovative approaches to increasing habitat resilience. In deciding how much fill to allow in a given project, monitoring and adaptive management plans will be essential to address this uncertainty.

- **Policy Options: Bay Plan Amendments**

1. Include language requiring that projects have an adaptive management plan, and stating what adaptive management plans should entail:
 - Pros: Adaptive management plans increase the project's likelihood of success, and allow for more uncertainty at the time of permit approval
 - Cons: Not all projects may have the budget or need to complete or adhere to an adaptive management plan
2. Add language stating that the level of design, amount of monitoring, and level of detail in an adaptive management plan required for a habitat restoration project should scale with the project goals, size, impact, level of uncertainty, and expected duration:
 - Pros: This would ensure that projects do not need to do more design, monitoring, or management than is necessary or appropriate for the project.
 - Cons: The proper level of design, monitoring, or management for a given project may be subjective and/or difficult to determine
3. Add data sharing and data synthesis requirements for BCDC's monitoring data to require that this data is informing projects, and feeding into regional monitoring and data collection efforts:
 - Pros: This would ensure that BCDC's monitoring data is utilized, both to improve internal efforts and to enhance knowledge in the region
 - Cons: This will likely require more resources both at BCDC and for the applicant; also, a designated repository for regional monitoring data does not exist yet
4. Add policy language to ensure that applicants are able to financially and logistically support monitoring and adaptive management needs:
 - Projects with adequate funding will be more likely to adhere to goals and be "successful" if applicants have the funding in place for ongoing monitoring and adaptive management
 - Some valuable and well-designed projects may not have funds to ensure these activities at the time of permit approval
5. Add policy language to further define, encourage and guide the use of pilot and demonstration projects as proof of concept and information-gathering mechanisms:
 - Pros: If their performance is monitored and the data is shared, pilot/demonstration projects could reduce the uncertainty about future projects' design, and potential impacts
 - Cons: There may not be sufficient time before the threat of sea level rise intensifies to learn from pilot projects before implementing larger-scale fill projects; may be hard to determine what exactly constitutes a pilot project; if pilots fail, they may cause more harm than good

- **Solutions Outside the Bay Plan**

1. Develop a regionwide/programmatic permit for pilot restoration projects and/or restoration projects in general
 - Pros: Such a permit may streamline the permitting process for restoration projects, and perhaps make it so they do not need to do as much intensive design/impact assessment early in the permitting process
 - Cons: Could potentially allow projects with a higher chance of negative impacts or failure (including those that lack clear, solid goals and design) to be approved
2. Create a monitoring guidance document
 - Pros: Increase consistency in BCDC's monitoring requirements
 - Cons: Potentially time-consuming; may need to be updated regularly

- **Workshop Feedback**

1. Make sure to have tools and data to learn faster
 - Rapid approvals if there is clear benefit, the project has resources, etc.
 - "Programmatic pilot" permits that would be easily adaptable
2. Goals of pilot projects should not have equal goals of a permanent project
 - With pilots, shouldn't be afraid of making mistakes
 - Create clear criteria
 - BCDC already has the authority within the law to do pilot projects
3. Monitoring—require or encourage?
 - Require: Requirements should be tied to area of greatest need
 - Encourage: Identify sensitive areas; consider the lens/discussion that has been happening around the Environmental Justice Bay Plan Amendment.
4. Monitoring is good by project, but also need periodic large-scale evaluation of lessons learned and feedback in this process.
5. Option 2: Can see benefit of requiring larger projects to have monitoring that can help a greater area.
6. Option 3: Wetlands Regional Monitoring Program (The Nature Conservancy, Stanford, San Francisco Estuary Institute Atlas, etc.) can help identify where pilots could be more effective, which types in what places, AND can analyze success, but will take time.
 - Add wording that acknowledges better guiding science to come – and be clear on what science is used.
7. We want to incentivize good pilot projects.
8. Embrace temporal, spatial, etc. uncertainty while holding them to high standards of showing the science the proposed project is based on.
9. Is size actually a key variable in determining monitoring requirements?

10. Update Commission on Montezuma Wetlands Project - use knowledge from older projects; need proper feedback of knowledge
11. We need to clearly define what an adaptive management plan is. Strengthen language around what needs to be included in an adaptive management plan; acknowledge that requirements will vary project by project (e.g. size, scale, location, geography should be considered to ensure the right plan).
 - Requirement
 - Guidelines
12. Edit out Bay Plan language about Middle Harbor
13. Delta Stewardship Council - Delta Plan has appendices with adaptive management plan requirements, and a policy on adaptive management and best available science.
14. Staff expertise is really important for permit review - need for wetland scientists
15. Monitoring data should be fed into models to inform better practices.
16. Like idea of creating a regionwide program/permit system...but with BRRIT will this still be necessary?
17. Are bonds (a type of financial security) an option for partially funding future monitoring?
18. How can you estimate how much an Adaptive Management plan will cost?
19. Too burdensome on applicant and staff to prove financial accountability
20. Should these types of projects be subject to Permit Streamlining Act timeline if they require more review? i.e. CEQA category exemption for projects less than 5 acres— projects of this size do not require review:
 - Editorial Note: The Permit Streamlining Act currently applies to all of BCDC's permits.
21. Need new mitigation requirements
22. Endowment model doesn't work for a public entity...financial assurance may not be the right process to adapt/fix. Other options include letter of credit, etc., like the CDFW model.
23. What is BCDC's role in facilitating coordinated small pilot projects?
24. Need guidance for analysts on restoration goals.

4. Impacts and Habitat Type Conversion Caused by Fill

- **Policy Challenge:** In some cases, restoring habitats may entail converting existing habitats into another habitat type, and there is a need to determine when and where this is beneficial and appropriate. Many fill applications that may be necessary to prevent habitats from drowning with sea level rise may also have negative impacts on those habitats. This includes projects that convert one type of habitat to another. While fill may have impacts on the Bay, in some cases these impacts may be less than the harm expected by habitat loss from sea level rise.

- **Policy Options: Bay Plan Amendments**

1. Add language noting the potential impacts that may be associated with restoring complete ecosystems and creating valuable habitat (e.g. creating new marshes, subtidal habitat, islands, etc.)
 - Pros: Serves to remind applicants and analysts to use caution and think about a suite of potential outcomes when considering projects that allow large volumes of fill in the Bay
 - Cons: This kind of language might not be that essential or useful to analysts
2. Add requirements to analyze the relative impacts and benefits of fill to make habitats better adapted to sea level rise
 - Pros: Helps applicants and analysts to assess whether it is appropriate to fill a given site for sea level rise adaptation
 - Cons: Impacts and benefits may be difficult to determine for fill methods that have not been used in the Bay
3. Require that applicants and analysts examine the impacts of habitat loss or type conversion on habitat availability and needs. Consider cumulative impacts of all projects, as opposed to individual project impacts. Approve type conversions within an adaptive decision framework, and only allow new projects incrementally as we monitor and learn
 - Pros: Allows careful and experimental implementation of type conversion. Reduces the risk of cumulative impacts, and encourages consideration of the regionwide habitat requirements for all Bay organisms
 - Cons: This could still cause some impediments to the need to act quickly to restore habitats prior to predicted rapid increases in sea level rise mid-century. Also, there is no current knowledge of how much habitat is needed to support Bay fish and wildlife
4. Defer action on amending Mitigation policies to the Mitigation Bay Plan Amendment (tentatively scheduled to be initiated in Fall 2019)
 - Pros: Issues related to the impacts of fill for habitat projects and mitigation for fill for habitat project impacts could be addressed comprehensively
 - Cons: The appropriate policies may not be in place to ensure that large fill for habitat projects in the Bay do not have unforeseen consequences

- **Solutions Outside the Bay Plan**

1. Develop a detailed guidance framework to facilitate the determination of acceptable fill impacts or habitat type conversion, and appropriate mitigation when necessary.
 - Pros: would further help applicants and analysts to assess whether it is appropriate to fill a given site for sea level rise adaptation
 - Cons: A lot of this information is still not known, so it may be difficult to create a helpful guidance document at this stage

2. Create GIS layers that could demonstrate ideal sites for restoration, protection, and habitat type conversion based on species distributions, manner and extent of species use of various sites, (natural) community distributions, and physical processes that sustain habitats.
 - Pros: This information would support a guidance framework, and would help applicants and analysts to determine which sites are best suited for fill for various habitat restoration/enhancement purposes
 - Cons: Layers would need to be maintained and updated with the most recent data. Due to limited funds and personnel, these tools may be difficult to maintain. This information is largely incomplete for Bay fish and wildlife
3. Collaborate with other agencies to develop a compatible approach to mitigation (e.g. a regional advanced mitigation program)
 - Pros: Coordinated approaches to mitigation would provide more consistency for applicants and analysts
 - Cons: Would require more time and resources to develop and assess compliance
- **Workshop Feedback**
 1. Concern that incremental change/project approval will be too slow
 2. Pro adaptive decision framework
 3. Habitat types—how much of each type do we want and need?
 - Talked about 100,000 acre goal and what that means (low/mid/high marsh zones, how much of each are we aiming for?)
 - No real goals for subtidal habitat, which was a concern to some
 4. Option 1 – “Complete ecosystems” felt subjective to some, but that is a defined term in other guiding docs.
 5. How do we determine where these conversions will go? Will money/benefits go back to the community?
 6. GIS layer solution—who would do this? What is the mechanism for updating?
 7. Could we apply a regional framework with other agencies about type conversion and the adaptive framework? Could we collaborate on the decision framework? EPA is undertaking this effort with other agencies currently.
 8. How might options outside the Bay Plan be put into action? Part of the Bay Plan?
 9. Other projects already change habitat (open tidal channel). How is this different?
 10. How do we consider intermediate habitat types, and habitat recovery trajectories?
 11. Tidal Marsh and Tidal Flats Policies 2 and 3 – look at word choice and tone
 12. Mitigation on net-benefit project—big no. “Self-mitigating” projects maybe not a good framing. Essentially, people were very concerned about potential mitigation requirements on habitat restoration projects.

13. We need to act quickly and using a regional framework could slow things a lot on a project by project basis.
14. Option 4: Deferring action until the Mitigation Amendment is a no go. Almost everyone felt the need to act sooner rather than later.
15. Who does the analysis in Options 1 and 2? Each applicant? This may be a big burden.
 - BUT fill in the Bay is a big deal, plus consultants hired to do this work may not be impartial.
16. Need to find a balance between these with good scientific support. This needs to be broad, not species focused, for example.
17. Change language to “recommend” not “require”—allows flexibility, but requires groups to support their ideas.
 - Recommend isn’t enforceable—that’s something we would put in a guidance document
 - “Scale” to project, but also need to standardize
18. Participants requested to see all of these notes in context on line or sent out to them.
19. Concern about Option A being too hard to update as new information comes.
20. Concerns over the mitigation statement, staff needs to clarify what is meant by the language on the poster
 - Clarify what would be ‘self-mitigating’, etc.
21. We don’t have enough sediment available from dredging projects
 - How will we do this stuff with limited dredged sediment
 - Natural sedimentary processes could help this along
 - Upland fill? Very few examples so far. We are ‘learning as we go’.
 - Support for Option 4—slow things down - this was from one person, most everyone else in the group felt it important to move quickly
22. Support Option c for collaboration with other groups.

5. Fill for Shoreline Protection and Multi-Benefit Projects

- **Policy Challenge:** Adapting to sea level rise using nature-based solutions, including large-scale habitat restoration that serves as flood protection, will require new policies to address Bay Fill. Although the Bay Plan contains language on nonstructural shoreline protection, the use of marshes for shoreline protection, and the co-benefits of habitat restoration and shoreline protection, most Bay Plan Shoreline Protection policies have a stronger focus on hardened structures, especially riprap. Policy language could be strengthened and expanded to encourage nature-based strategies.
- **Policy Options: Bay Plan Amendments**
 1. Add language requiring the use of the best available science to assess nature-based shoreline protection strategies for different parts of the Bay.

- Pros: This will ensure that the most recent science on the sustainability of multi-benefit shoreline protection projects is used to make decisions about shoreline protection
2. Amend the language to state that nature-based or nonstructural solutions to shoreline protection should be used and that applicants must demonstrate why nonstructural solutions are not feasible.
 - Pros: This would ensure that applicants try to use natural shoreline protection primarily, and consider creative solutions to incorporate natural shoreline protection into all shoreline protection projects
 - Cons: It may be difficult to prove that natural infrastructure solutions are not possible
 3. Lessen mitigation requirements for living/natural shoreline protection projects in comparison to hardened shoreline protection projects
 - Pros: This further incentivizes the consideration and use of natural shoreline protection
 - Cons: In some areas hardened infrastructure is necessary to protect human life and property, so it may be unfavorable to require more mitigation for this work.
 4. Amend the language to include other habitat types
 - Pros: Tidal marshes are only one of many habitats that provide shoreline protection benefits. Other includes oyster reefs, mudflats, and upland transition areas.
 5. Defer action on amending Shoreline Protection policies to the Fill for Flood Protection Bay Plan Amendment (tentatively scheduled to be initiated in 2021)
 - Pros: This amendment will focus on potentially allowing Bay Fill for the primary purpose of shoreline protection.
 - Cons: There will be a delay in any amendments to the Bay Plan Shoreline Protection policy language
- **Solutions Outside the Bay Plan**
 1. Use information from NFWF Resilience Hubs project with Point Blue Conservation Science to identify “resilience hubs” where there is overlap in species and community resilience potential
 - **Workshop Feedback**
 1. Discussed relationship between new types of nature-based infrastructure, pilot projects, and scaling up
 2. FEMA-limits to certification for shoreline protection
 3. Support for Option 3 and Option 4
 4. Option 3: Marin is lessening mitigation requirements -> limiting burden of proof
 5. Add best available science:
 - Need to be able to explain clearly and in a detailed way to applicants.

- Opportunities for sharing lessons learned are important.
 - How to define best available science—don't want applicants to cherry pick; need a guide to the "right" science.
 - Needs to be a way to start from the right place and then alter with new science.
6. Importance for language to address green – grey spectrum and appropriateness for certain solutions (e.g. pocket beaches).
 7. Sometimes nature-based concepts can't fully protect from sea level rise. May need to include some hardened structures. But requirement to include green infrastructure as part of this is helpful to the environment.
 8. Set of guidelines for shoreline protection would be valuable, and provide more flexibility
 9. Develop joint guidance document with BCDC and RWQCB, etc.
 10. Obstacles in permitting process for smaller organizations/projects. Need to make this easier to navigate, and shorten the process.
 11. Sometimes applicants can look at the wrong type of green solution for a given site (e.g. tie Option 1 to Option 2)
 12. Suite of options from BCDC or applicant? Who is expected to provide guidance?
 13. New guidance from SFEI and other studies.
 14. Marin County—Bayfront Conservation Zones—looking at "burden of proof"
 15. Some pushback against Option 5—important to start addressing shoreline protection to some extent during this amendment process
 16. What is "multi-benefit"? Not just shoreline protection and habitat? Multi-benefit could include protecting transportation, wastewater, public access, flood protection, recreation, etc.
 17. What does "feasible" mean?
 18. What is the extra incentive for projects that create multiple benefits (streamlining, etc.)? How to expedite these projects?
 19. If a project creates multiple ecological benefits
 20. If applicant wants to "do good" with habitat value, etc., we wouldn't want to burden them too much.
 21. If it's a restoration project, mitigation won't be required.
 - If it is a flood control project like a horizontal levee, it is important to think about options of using wetlands. Is mitigation still appropriate if you're talking about other options?
 - Nuance in design and mitigation
 22. Explore different mitigation ration than 1:1 mitigation...if mitigating for fill, and there is a green aspect, you might use a lower mitigation ratio than if it were all gray
 - Editorial Note: BCDC normally requires 3:1 mitigation

23. What does “expedite” mean? It’s tricky with the sequential nature of BRRIT-like ideas. Thinking about “perks” vs “expedite” (If you use green solutions, hopefully this would expedite the permit process. Should there be a BRRIT-type body for shoreline protection projects rather than just restoration-based projects? “Perks”...instead of speed, what other benefits could be given to people who do use green solutions?)
24. Point Molate example (see drawing)
25. Alameda—Crown Memorial State Beach.
26. Feasibility of looking at situations in which green solutions require more fill than grey
27. Have applicant demonstrate why green solutions would not work—this is where money becomes an issue.
28. “Timing” concerns are sometimes used as an excuse to choose hard options. For example, erosion protection.
29. Studies for green solutions take time...how to guide?
30. Tradeoffs are involved for short and long term projects
31. Avoid using word “prove”...can’t prove. Initial restorations may fail.
32. Delay in projects due to permits—some projects are urgent though.
33. Consider the long/slow historical pace of sea level rise and its effects in deciding management/protection options
34. Is what we have now perfect? No, but most of what we are doing is trying to reverse what we screwed up in the past 100 years.
35. We should be counter-balancing with policy for retreat
36. Term of investment for projects?
37. Guidance is important for Option 2: site checklist, priority use areas/airports?, design atlas.
38. Issue with the level of research we are expecting applicant to do in many of these options.
 - But it is important to see considerations of other solutions.
 - Could be an online tool with database, menu guidebook.
39. Applicants want reliability and clearness of permit requirements.
40. Policy will need to include adaptive management
 - Don’t want to be stuck with an out of date policy
 - Monitoring and money – where you will get the money to pay for the monitoring is an important consideration

Other solutions outside the Bay Plan: Water Board “no net fill” policy; Marin County Bayfront Conservation District; 4th Climate Assessment.

6. Cross-cutting thoughts?

- Workshop Feedback
 1. If in matters of the Bay Plan vs the Suisun Marsh Protection Plan, where the more specific policies of the SMPP win, how do we address Restoration projects in the Suisun Marsh where we know great swaths of land will be underwater in a relatively short amount of time? Do restoration project policies have more weight?
 - Editorial Note: Between the Bay Pan and the Suisun Marsh Protection Plan, neither is the more specific policy, it is that they both apply, but when the two conflict, then the Suisun Marsh Protection Plan prevails in the Marsh.
 2. Managed retreat: BCDC current policies do not require managed retreat. In the face of significant SLR (greater than 3 feet) it will become needed too. BCDC should seek greater jurisdictional powers over the 100 foot shoreline band.
 3. Keep the policy changes “lean and mean”.