ISSUE PAPER

Aquatic Transfer Facility for the Hamilton Wetland Restoration Project Bel Marin Keys V Expansion

Prepared by
State Coastal Conservancy
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The basis of this issue paper is a series of Aquatic Transfer Facility (ATF) discussions between resource and regulatory agencies. The ATF isa 58-acre in-water basin for stockpiling and transporting dredged sediment to the 1600-acre Bel Marin Keys Unit V Expansion and the 250 acre North Antenna Field of the Hamilton Wetlands Restoration Project (HWRP) in the San Pablo Bay portion of San Francisco Bay. If built, the project would restore 1,850 acres of salt marsh, mudflat, subtidal channels, perennially open water, and seasonal wetlands while beneficially using an estimated 16 million cubic yards of sediment from dredging projects throughout San Francisco Bay to raise site elevations. Restoration of this habitat is important for the vitality of numerous native species. Especially important state and federally-listed species that would benefit from this restoration include the California clapper rail, salt marsh harvest mouse, black rail, and restoration would provide nursery and foraging grounds for longfin smelt and juvenile salmonids. The ATF is necessary to efficiently transport the dredged sediment from multiple dredging projects across five miles of mudflat and shallow bay to the restoration site. Without the ATF, the restoration project is cost prohibitive and likely would not be implemented. Instead of being beneficially used, much of the dredged sediment would go to in-bay placement sites or the deep-ocean placement site. That action would waste a valuable resource in an area with subsided land and vulnerability to rising sea level.

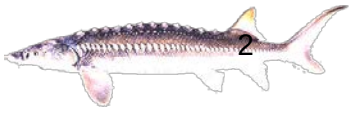
Hamilton Wetland Restoration Project

Background

The Aquatic Transfer Facility (ATF) is an approach to transfer dredged sediment to the Bel Marin Keys Unit V (BMK) expansion of the Hamilton Wetland Restoration Project (HWRP). In October 2008, the US Army Corps of Engineers (Corps) and the California Coastal Conservancy (Conservancy) issued a joint draft Supplemental Environmental Impact Statement and Report (SEIS/R) to the Hamilton Wetlands Restoration Project for the ATF. After receiving written and verbal comment from resource and regulatory agencies and the public, the Corps summarized the salient portions of the SEIS/R in a memo and submitted them to the National Oceanic and Atmospheric Administration (NOAA)-Fisheries and the California Department of Fish and Game (CDFG) for review and discussion. On 16 September 2010, staff from the Corps, Conservancy, San Francisco Bay Conservation and Development Commission (BCDC) and U.S. Environmental Protection Agency (USEPA) met with representatives of NOAA-Fisheries and CDFG. Following that meeting, the Corps prepared a summary memo based on the ATF SEIS and other information. This issue paper seeks to build on and summarize information contained in these previous documents and to focus on what we understand to be the most important concerns of NOAA-Fisheries and CDFG. We also hope to provide context that highlights measures to minimize potential impacts of the ATF and to examine how the ATF can fit into and be a part of long-term solutions to dredged material management.

The Corps and Conservancy are currently partnering to carry out the Hamilton Wetland Restoration Project, which consists of the Hamilton Army Airfield, including the North Antenna Field, and BMK. Those parcels are approximately 980 acres and 1,600 acres in size, respectively. To restore wetlands, surface elevations over the diked and subsided land, (some 5 to 15 feet below mean sea level) are raised using dredged material to marsh-plain elevations to quickly establish emergent marsh vegetation and, thus, habitat for listed and other native species. Because these large sites, such as these, require large volumes of sediment—17 million cubic yards in this case—hydraulic pumping of dredged material has been shown to be the only viable way to fill them. Not only are trucking and rail logistically unworkable, but hydraulic placement has the added benefit of mimicking natural slope and sediment distribution. Further, the region is facing decreased sediment supply, erosion of mudflats, and increasing sea levels. Without tidal wetland restoration, the water-quality, storm-buffering, and flood-protection features of tidal marshes would not be realized for this area. The Hamilton Airfield portion of the project (Phase I) is nearing completion (Fall 2012) with dredged sediment placement complete in March 2011. The construction at BMK (Phase II) has been put on hold because of budgetary constraints.

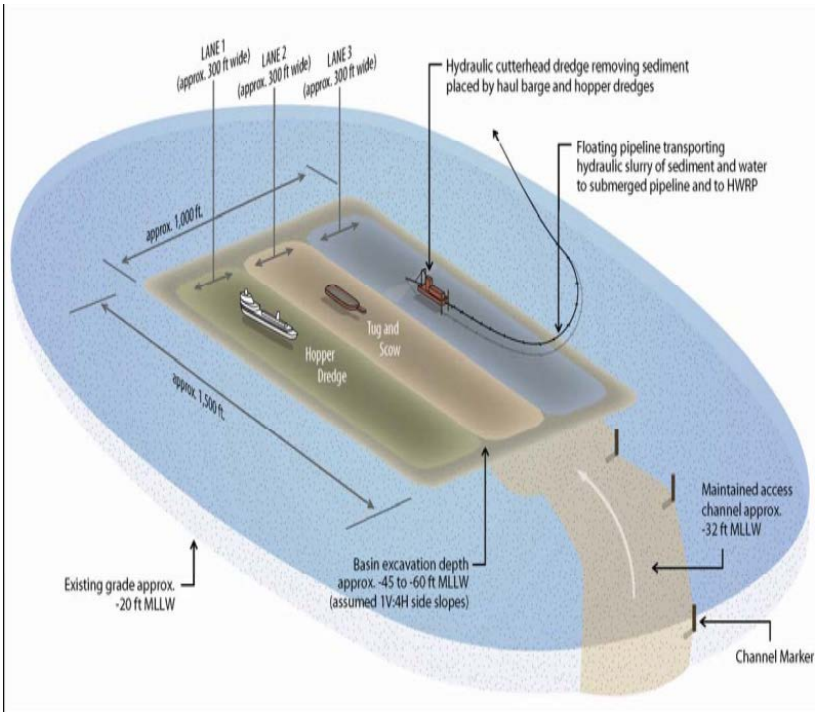
At the Hamilton Airfield parcel, the current method of transferring dredged material is by using an offloader that pumps material from individual barges through a pipeline to the designated site. That technique has proven to be much costlier than was originally estimated, being more than double the original estimate. Consequently, if an offloader is



used, the BMK portion of the project will be financially infeasible.

The ATF was a result of a Value Engineering Study (VE) undertaken by the Corps at the beginning of the HWRP. The VE study identified problems with the efficiency and logistics of an offloader. The Corps and Conservancy then undertook the SDEIS/EIR, which described and analyzed alternatives to the offloader. One alternative, the ATF concept, is simply a transfer basin for sediments that are destined for use on a terrestrial site. An analogy can be drawn between the ATF and a household recycling center, in which the homeowner drops off materials with little to no interaction with the end user or recycler of the materials. We believe the ATF is an innovative and unique approach to managing dredged material, and utilizes conventional dredging equipment that is readily available on the West Coast and the US market.

As presently envisioned, the ATF would be a shallow depression of approximately 58 acres[1], located on the bottom of San Pablo Bay, in a depth of approximately27 feet mean lower low water (MLW). The basin would be designed and located in an area that is depositional, so only a small volume of sediment would be lost during placement activities. The basin would be approximately 18 to 33 feet deep (below bottom), and the approximately 1.6 million cubic yards of sediment that would be dredged to create the basin and would also be beneficially used at the BMK parcel. An electrically-powered hydraulic dredge would be moored at the ATF for much of the year to pump the sediment as needed for the use project. In the case of BMK, the dredged sediment would be used to restore site elevations necessary for the over 1000 acres of salt marsh habitat described above. This concept has been studied and modeled by US Geological Survey (USGS) scientists, local experts, and the USACE. This modeling shows that suspended sediment concentrations from the site operation will be minimal and would quickly return to background levels even in the highest conceivable use.

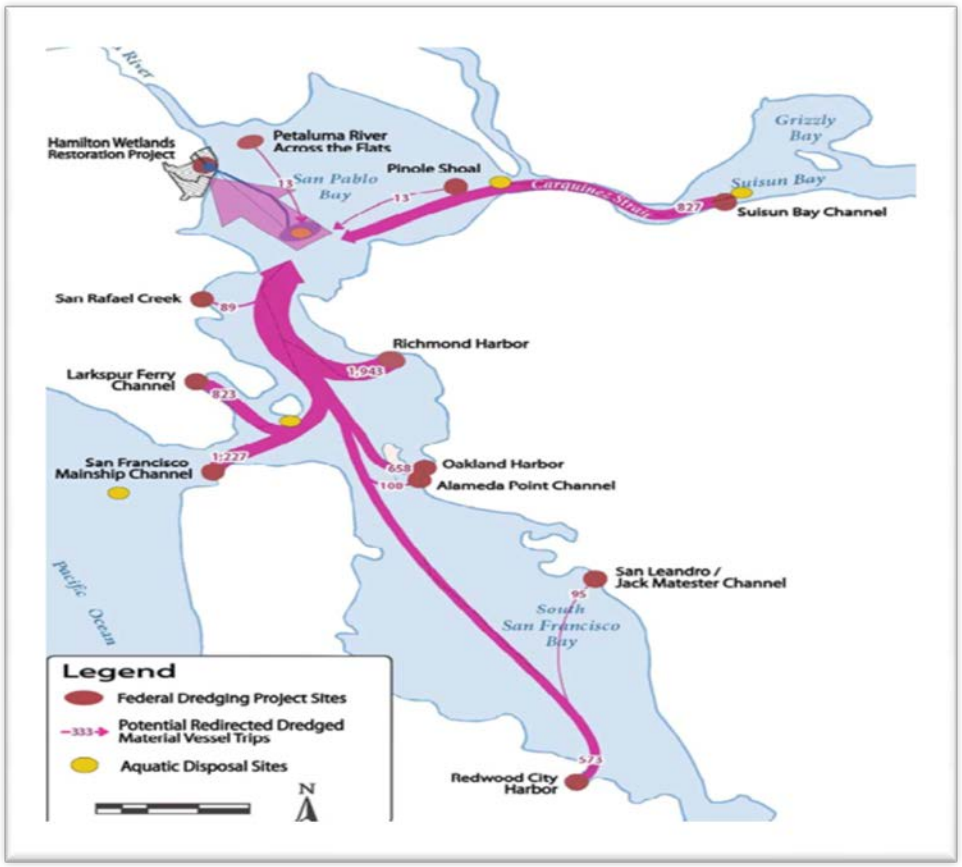


To date, approximately 85% of the dredged material used to fill the portion of the project that is within the former 700-acre Hamilton Airfield was from the Port of Oakland's

[1]The excavated bottom area would be 58 acres with side slopes slumping could be as high as 70 acres total.

Minus 50 foot Deepening Project. Consequently, the restoration project has benefited from the Port's deepening project as a "companion project," meaning that much of the sediment-offloading cost was borne by the Port deepening project rather than being paid for by the HWRP. Despite that fact, the Hamilton project is still expected to well exceed original cost estimates. The Port and Corps will have paid$75 million to offload about 4million cubic yards (mcy) of dredged material from the deepening project, and the Corps and Conservancy will have paid an additional $20 to 25 million to bring an additional 1.7mcy of dredged sediment to the site from various maintenance dredging projects.

Another outcome of the Port of Oakland deepening project was that it generated real-world data on offloading that can be used to inform decisions on future project management. For example, this experience with offloading at Hamilton is being extrapolated to restoration planning for other projects throughout the San Francisco Bay region. Phase II of the project, which entails, the 1600 acres BMK property and the 290-acre North Antenna Field will require approximately 17mcyof sediment to build up to the design elevations for tidal and seasonal marsh described in the project plan (2003 SEIS/R and GRR).



Why an ATF?

In 2010, studies commissioned by the Corps determined that an ATF could deliver the same volume of dredged sediment to the site in 7.5 years, as compared to 10 years with an offloader[2]. Following the comments received on the draft SEIS/R, the Corps updated the cost estimate conducted for an offloader and found that the cost would be approximately $340 million[3]. This is sharp contrast with the ATF, which the Corps estimated would cost$164 million. Therefore, the ATF would save approximately $175 million, which is greater than a50% savings in the transfer cost compared to the offloader.

Additionally, the ATF will capture more material in a shorter time, which jibes with LTMS goals and policy (below). The ATF has a major advantage over an offloader: logistical and contractor conflicts and concerns of the dredging project are essentially "decoupled" from the beneficial use project. For instance, logistical and traffic issues related to barge offloading essentially do not exist for the ATF. Another advantage of the ATF is that the suction dredge will be significantly more efficient than an offloader system, because of significant amounts of stand-by time between barge loads. With the ATF, the suction dredge would remove significant volumes at one time via stockpiling the sediment and steadily removing material from the basin. In addition to saving time and money, the ATF will fulfill the LTMS policy objective of maximizing the beneficial reuse of sediment because the ATF can serve a wide variety of dredged material generators (projects) including small dredgers, whose sediment would otherwise be disposed of in the Bay because it has virtually no restrictions on equipment size, type or logistics. Any type of dredge scow or vessel can place dredged sediment at the ATF; whereas, the offloader is designed to work with only certain sized scows and cannot readily remove material from hopper dredges (including the Corps' vessel *Essayons*).

There are also positive indirect benefits of the ATF. For instance, by eliminating placement at the deep ocean placement site, the ATF will reduce net emissions from ocean-going tug operations. Furthermore, the Corps estimates that the ATF will generate 33% less $C0_2$ than an offloader[4].

Restoration Project Benefits

Restoring the BMK Expansion site would result in approximately 1,600 acres of wetland, tidal, and upland habitat for fish and wildlife. Special status species that may benefit from

[2]In its cost forecasting, the Corps found that transferring 13.8 million cubic yards of dredged material to BMK would take as little as 6.7 years.
[3].In addition, in the fall of 2010 the USACE awarded an offloader contract to place approximately 600,000 at the Airfield for $14.3 million, which is $23.83 per cubic yard inclusive.
[4]SEIS/R Table 4.15-2

the restoration of BMK include salmonids, salt marsh harvest mouse, California clapper rail, double-crested cormorant, California brown pelican, white-tailed kite, northern harrier, golden eagle, Copper's hawk, sharp-shined shooter, peregrine falcon, California black rail, short-eared owl, burrowing owl, salt marsh common yellow throat, and San Pablo song sparrow. Juvenile green sturgeon, and longfin smelt, now listed as an endangered species in the San Francisco Bay Estuary, may also benefit from the restoration project.

Tidal marshes are among the most productive ecosystems in the world. They flourish when the rate of sediment accumulation is equal to or greater than the rate of land subsidence and where there is adequate protection from large waves and storms. Wetlands are areas of high nutrient and biological productivity that provide the detrital products that constitute the base of the food chain. Sediment and epiphytic algae are often important components of the autotrophic community. Heterotrophic communities are often dominated by the detrital food chain of tidal wetlands, providing foraging habitat for several threatened and endangered species. In addition, tidal marshes are out-welling systems that export organic matter to adjacent estuaries.

Tidal marshes provide direct prey resources to several aquatic and terrestrial organisms, including listed juvenile salmonids. Because they are generally rich in invertebrate organisms[5], tidal wetlands and mudflats that would be created as part of the BMK restoration project could provide high-value foraging habitat for juvenile salmonids, Shallow tidal wetlands and salt-tolerant vegetation (grasses and rushes) can provide refugia from predators[6]. Some studies suggest that juvenile salmonids that rear in wetland areas grow larger and, therefore, may be less prone to predation when they enter the marine environment[7].Restored tidal wetlands may also directly benefit other species including starry flounder and English sole, which are known to use tidal wetlands for rearing, and Sacramento splittail, which may use wetland habitat for spawning and rearing (Brown 2003).

Tidal wetlands may also indirectly benefit several protected species that do not directly use tidal wetland habitat (e.g., EFH-managed species that inhabit San Pablo Bay). Export of organic detritus from tidal wetlands can increase primary productivity in adjacent estuaries[8].Detritus that flows to the estuarine waters can sustain prey species for several aquatic organisms and help support secondary production, especially in estuaries where plankton primary production is depressed. Studies suggest that organic detritus, either filtered from the water or ingested from the sediment, is an important alternate source of energy for aquatic organisms, especially when plankton concentrations are low.

Tidal wetlands can act as a buffer against the effects of sea level rise by stabilizing shorelines and creating a buffer against erosion. Tidal wetlands can also sequester carbon

[55]Mitsch and Gosselink, Roegner et al. 2010; Levings, Conlin and Raymond 1991; Simenstad and Cordell 2000; Gray et al. 2002
[6]Gray et al. 2002, Simenstad and Cordell 2000, Boesch and Turner 1984.
[7](Brown 2003; Sommer, Harrell and Nobriga 2005.
[8]Boesch and Turner 1984.

and thereby help offset the emission of green house gases[9].

Creation of wetland habitat through implementation of the ATF would have direct benefits to fisheries and the ecological health of SF Bay and adjoining ocean by significantly reducing, if not completely eliminating, dredged material placement in the ocean and bay while BMK is being filled. There will also be benefits to benthic communities located at and near Alcatraz, the other two in-bay sites, and the deep-ocean water column that result from the diversion of dredged material to the ATF and, hence, to the BMK. Once the BMK is returned to tidal action, bay fishes will benefit from the newly-restored wetland habitats.

LTMS

The San Francisco Bay Long Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region (LTMS) was formed in the 1990s in response to the public's growing concern over the potential direct, indirect, and cumulative effects of dredging and dredged material placement activities on the already stressed resources of the San Francisco Bay/Estuary (Bay or Estuary). Participating agencies include the Corps, USEPA, San Francisco Regional Water Quality Control Board (SFBRWQCB), State Water Resources Control Board, the San Francisco Bay Conservation and Development Commission (BCDC), and State Lands Commission.

The LTMS program area spans 11 counties. It also includes the wetlands and shallow intertidal areas that form a margin around San Francisco Bay and the tidal portions of its tributaries. Not only does it cover bay sites, but also included are the San Francisco Deep Ocean Placement Site (SF-DODS), the San Francisco Bar Channel Placement Site (SF-08) including the near-shore zone off Ocean Beach of San Francisco. Since the implementation of the LTMS, placement of the majority of the dredged material in the San Francisco Bay area has taken place at four state- and federally-designated in-Bay placement sites within the Estuary—Suisun Bay (SF-16); Carquinez Strait (SF-09); San Pablo Bay (SF-10); and Alcatraz (SF-11)—and one deep-ocean placement site (SF-DODS), which is located approximately 55 miles west of the Golden Gate. (Figure X)Between 2000 and2007,an average of approximately 2.7 million cubic yards of dredged material was annually placed at aquatic placement sites.

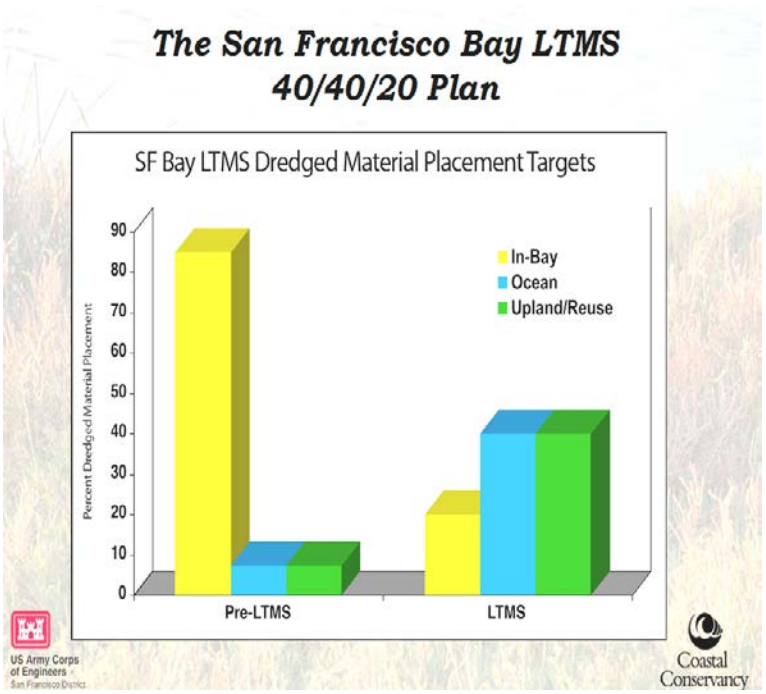
The LTMS Management Plan calls for the beneficial use of at least 40 percent of material dredged in the San Francisco Bay region, no more than 20 percent can be placed at in-Bay placement sites, and 40 percent can be placed at SF-DODS. The 40-40-20 plan detailed in the Management Plan is based on average annual dredged material placement volumes from 1955 to 2005. This plan called for reversing the historic practice of in-Bay placement of at least 80 percent of all material dredged from the Estuary and requires that at least 80 percent of material be placed at beneficial use sites, upland, or ocean placement sites.

[9]California Climate Action Registry 2009.

Over the life of the SF Bay LTMS, the selected 40-40-20 alternative aims to:

- Maintain in an economically and environmentally sound manner those channels necessary for navigation in San Francisco Bay and eliminate unnecessary dredging activities.
- Conduct dredged material placement in the most environmentally sound manner.
- Maximize the use of dredged material as a resource.
- Maintain the cooperative permitting framework for dredging and placement applications.

The Hamilton–Bel Marin Keys Wetlands Restoration project is a key part of the LTMS Management Plan because it provides a large, centrally-located beneficial use site that is practical for the San Francisco Bay dredging community.



The LTMS outlined a goal of reducing placement in the bay with a "step down" over time to 1.25 million cubic yards per year by 2012. However, the LTMS policy documents[10] also direct projects to beneficially use sediment at wetlands or other upland sites rather than place them off the continental shelf. That means that the preferred outcome would be closer to 100% beneficial use. The LTMS is in its third step-down phase and is targeting a maximum of 1.67 mcy being placed in-Bay, stepping down again in 2012 to a maximum of 1.25 mcy at in-Bay sites. The Corps is a signatory to the LTMS and recognizes that the Corps' dredging program cannot rely on aquatic placement and took on Hamilton in part to help implement the LTMS. Therefore, if projects like BMK do not go forward, then the regional goals for reduction of aquatic placement will not be met. This is because there are few other sites or end-users that are positioned to accept dredged sediment in the near term.

Though Bay Area dredge volumes are lower now than in previous decades, the annual amount of clean dredged sediment generated in San Francisco Bay is still large compared to other bays and estuaries. The average is approximately 2.7 mcy per year, much of which is placed at multi-user in-bay and ocean placement sites[11]. The remaining clean dredged sediment would be beneficially used at the BMK or other beneficial use sites.

[10] LTMS Management Plan2001

[11] ATF SEIS/R table 3-1.1

The BMK is particularly important to this program because it is the largest site that is centrally located to most dredging projects, is sponsored by both the federal and state government, and will complete a series of habitat restoration projects that will become part of the San Pablo Bay National Wildlife Refuge.

San Francisco Bay's deep-draft navigation system supports billions of dollars of maritime commerce, including container ships, petroleum tankers, and transoceanic automobile ferries. The majority of navigation-channel dredging in the Bay Area is carried out by the Corps as routine maintenance of federal channels. Oakland and Richmond harbors and Pinole Shoals dredged annually or biennially. Non-federal entities—e.g., local ports, refineries, bulk cargo terminals, marinas, and ferry terminals—also must maintain channels, berths, and terminals.

As part of the LTMS program, dredge material placement at these sites has been reduced over the past10 years; however, even at the end of the LTMS "step-down" period, these sites will remain open to the projects that have clean sediment, no beneficial use option, or the inability to take sediment to the deep-ocean placement site. However, the target volume remains, so having beneficial use options available, particularly while others are being developed, is critical.

Currently, there are three large-scale restoration projects that require dredged sediment for construction: Hamilton-BMK (Novato, Marin County), Montezuma Wetlands (Collinsville, Solano County), and Bair Island (Redwood City, San Mateo County). However, Montezuma and Bair Island are more remote from the majority of dredging projects, whereas the Hamilton-Bel Marin Keys project is centrally located. Given the central location of Hamilton-BMK, it is reasonable to assume that a yearly average of at least1 to 1.5 million cyd of material could be transported to that site with the balance being used at the other sites. This scenario would result in 100% beneficial use of dredged sediment and zero aquatic placement[12]. If the Bay's average volumes of material were shared 50:50 between Hamilton-BMK and other beneficial use sites, then the timeframe to operate the ATF would be in the range of 14 to 16 years; however the ATF could be in operation for as little as eight years if it received most of the available dredged sediment. Unfortunately, projects like Hamilton-BMK now face economic, regulatory, and logistical constraints that force dredging sponsors to place the sediment in the bay and ocean. This practice is a waste of a valuable resource, the supply of which is in decline because of natural and economic forces.

Areas of Concern

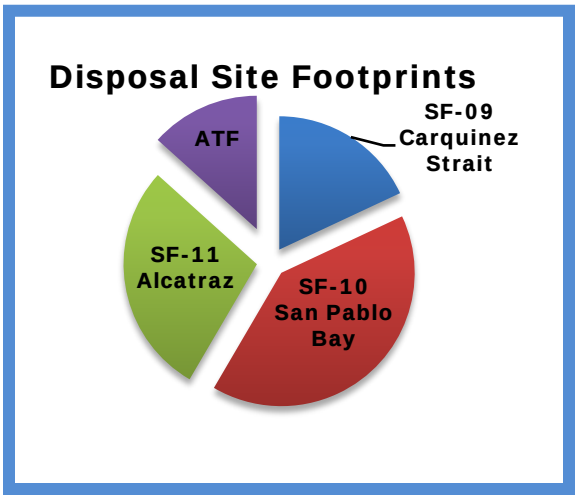
The two main concerns voiced by NOAA-Fisheries and DFG staff were burial of in-fauna during placement and subsequent entrainment by the suction dredge during construction and operation. While analyzing the potential impacts of this part of the project, it is also important to examine the impacts of the ATF within the context of dredged material management and placement in the San Francisco Bay Area.

[12]This assumes the material has been tested for contaminants and has been found to be is "clean".

Burial

The NOAA-Fisheries is concerned about burial of benthic fauna during ATF construction and operation. Benthic habitat at the ATF site would be lost for the duration of the project; however, this habitat would reestablish after conclusion of the project. An issue that has been raised repeatedly in SEIS/R comments relates to burial of infauna and resident fishes, so it would be appropriate to compare burial at the ATF to the in-Bay placement sites. However, little is known about the habitat values of the three placement sites as compared to non-affected or reference areas[13]. One comparison that can be drawn between the ATF and the existing in-bay placement sites is the site footprint (the areal extent of the various placement sites). The proposed ATF would have a footprint of 1,000 ft. by 1,500 ft., or approximately 58 acres (23.5 hectares)[14]. This compares to a total of 221 acres (90 hectares) for the three in-bay placement sites[15].

Because the ATF would take virtually all dredged sediment currently placed in the bay (see figure), one net benefit to the bay from using the ATF would be that about 163 acres (66 hectares) of benthic habitat would not be subject to repeated burial and inundation. An important caveat to this comparison is that the existing placement sites were intended to be "dispersive", in that material is expected to migrate from the site relatively rapidly, whereas the ATF is intended to contain as much of the material as possible with minimal dispersal. Once enough material has been transferred to the BMK site, the ATF would be decommissioned by filling it in with dredged sediment or by allowing the site to fill in naturally.



In particular, the majority of sediment placement occurs at SF-11, so use of the ATF should result in positive impacts to the rocky sub-tidal communities located at the base of Alcatraz Island. Reducing the impact to these rocky communities, which are limited in area though out San Francisco Bay, would directly benefit fisheries.

According to the Corps[16],in the years between 2000 and 2007,the Alcatraz placement site received an average of 1,015 mcy, which is about 47% of the volume of material placed at the three in-Bay sites and SF-DODS.SF-09 and SF-10 received27%, and SF-DODSreceived46%[17].Concentrating placement activities at the ATF with concurrent reduction, or outright elimination, of placement at the other present sites would result in

[13]San Francisco Subtidal Habitat Goals Report
[14]Excavated area would be 58 acres with side slope slumping could be as large as 70 acres total.
[15]SF-08 is not included in this analysis because it is located west of the Golden Gate and because it receives material from just one project, the Corps' maintenance of the ship channel over the San Francisco Bar. .
[16]ATF SEIS/R table 3.1-1)
[17]ibid

net positive impacts to163[18] acres of benthic communities and have less of an impact on the water column at SF-DODS.

Entrainment

The NOAA-Fisheries and DFG staffs are concerned that the hydraulic dredge could entrain fishes while transferring sediment from the ATF to the BMK. Although there is the potential for entrainment, a review of the available literature indicates that the likelihood or magnitude of this impact is not well understood. A proposed course of action is for the Corps and Conservancy to work with fishery conservation groups and fishery experts to conduct a pilot study to monitor the ATF operations to determine whether entrainment is real and, if so, determine what can be done to reduce it to an acceptable level. Only through a rigorous scientific study can a better understanding be gained of the loss or "take" from hydraulic dredge operations. Then, if needed, physical, engineered controls can be implemented or best management practices instituted to exclude fish entrainment.

Conclusion

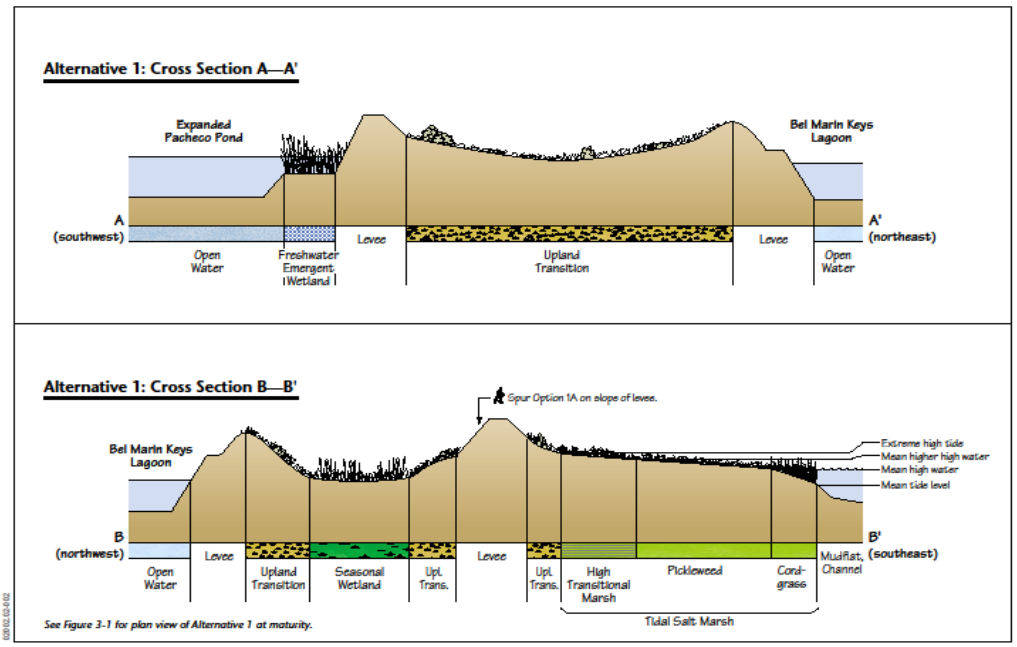
Without the ATF, the Conservancy may not be able to enter into a partnership with the Corps for the second phase of restoration of the Hamilton Wetland Restoration Project (Bel Marin Keys Expansion site). And without appreciable sediment placement, restoration of BMK would not result in tidal marsh, mudflat, and shallow sub-tidal habitat benefits. Rather, it is likely that most of the subsided site would eventually be breached to the bay, and the potential to restore well over one thousand acres of wetlands in this part of San Pablo Bay would be lost forever. Because of the subsided nature of the site, it is unlikely that simply reconnecting it to the Bay will lead to tidal wetland elevations by natural sedimentation,. Even in the long-term (50-100 years), an equilibrium condition with tidal wetlands is a virtual impossibility given sea level rise and lower suspended-sediment loads anticipated for the Estuary. Therefore, the Conservancy and the Corps are seeking resolution with NOAA Fisheries and the DFG to allow the construction and use of the ATF as a project component of the Bel Marin Keys phase of the Hamilton Wetlands Restoration Project.

[18] The figure grows to 350 acres if SF-16, the Suisun Bay site is included; however, it is unlikely that material from Suisun Bay would be transported to Hamilton.

Additional Information

How Dredged Material is Used

Preparation of the BMK site to receive dredged sediment is a major undertaking that involves earthwork costing millions of dollars. Once the design has been finalized and permits are issued, the Corps and Conservancy would place sediment in temporary cells to dewater the sediment (2003 SEIS/R Bel Marin Keys Expansion of the Hamilton Wetlands Restoration Project)Dredged material would be placed along the east side of a new levee that will bisect the site. The sediment fill will be used to create elevations suitable for the establishment of high-transitional marsh. Dredged material would also be placed along the east side of the proposed outboard levee to create the elevations suitable for transitional marsh establishment. After dredged material placement is complete, the outboard levee would be breached in two locations to restore hydrologic connections to San Pablo Bay. The levee along Novato Creek would be lowered to facilitate overflow onto the expansion site from Novato Creek during peak floods. The existing outboard levee along San Pablo Bay would also be lowered to facilitate the establishment of mid-high marsh vegetation. Several small portions of this levee would be left in place as high tide refugia. Final marsh plain elevations would be established through the deposition of fine-grained sediment from San Pablo Bay and Novato Creek. Final surface elevations in the two marsh sub-basins would range from 0.5 to 3.5 feet NGVD. Elevations in the channel bottoms would be lower, particularly in the breach areas.

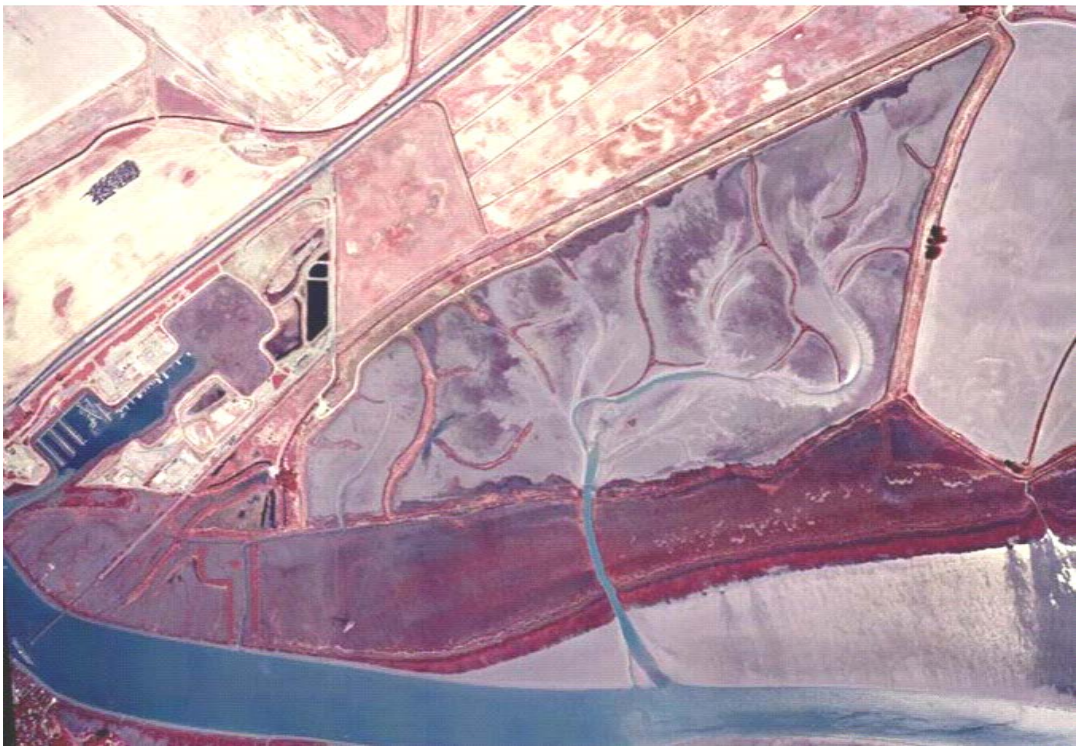


Jones & Stokes
nhc northwest hydraulic consultants

Figure 3-2
Schematic Cross Sections of Habitats Restored under Alternative 1

Sonoma Baylands: Model Project

In many ways, the model project for Hamilton-BMK is the 322-acre Sonoma Baylands restoration project. The project site was filled with sediment dredged by the Corps, predominantly from the Port of Oakland minus 42-feet deepening project. The project, which was constructed in the early 1990s and breached in 1995, has flourished. Post-construction site monitoring, funded by the Corps and Conservancy, show usage by a wide variety of fish species including striped bass, top smelt, Pacific staghorn sculpin, Bay pipefish, and Sacramento split-tail[19].Additionally, the mudflats have been used by bat rays, which leave distinctive patterns in the mudflats.



[19]PWA, July 2009 2006 Annual Monitoring Report

Institutional Arrangements

The Hamilton Wetland Restoration Project is carried out as a joint effort between the Corps and Conservancy, pursuant to a project cooperation agreement (PCA). The Coastal Conservancy is the non-federal sponsor for the Project. Corps policy requires that the Conservancy pay a share of the total project costs, ranging from 25% for restoration work to 50% for recreation features. Likewise, the Port of Oakland served as the non-federal sponsor of the Deepening project and paid a cost-share in the range of 35%. The non-federal sponsor is required to supply the lands, easements, rights of way, and relocations. Therefore, the Conservancy, as the cost sharing-sponsor, has a vested interest in not only the environmental benefits and project outcomes, but also the cost-effectiveness of the methods chosen by the Corps to implement the project.

Regional Planning

In the long-term, the Marin County communities of Hamilton and Bel Marin Keys will have a flood reduction benefit from the tidal marsh and new levees constructed along the bay. Several studies of sea level rise on the Marin bay shoreline are underway[20]. The project fits with the County's vision for the area: In 2007 the County of Marin designated large areas, including Hamilton–BMK as a "Baylands corridor" in an overlay on the county's revised General Plan.

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