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MEMORANDUM

To:	U.S. Army Corps of Engineers, Los Angeles District Attn: Naeem A. Siddiqui
From:	Craig Jones, Ph.D., Integral Consulting Inc.
Date:	1/27/2020
Subject:	East San Pedro Bay Ecosystem Restoration Study Draft IFR - Review Comments

I, Craig A. Jones, Ph.D., am presenting the attached expert review comments on the East San Pedro Bay Ecosystem Restoration Project for consideration by U.S. Army Corps of Engineers. (USACE). I am an ocean and environmental engineer with over 20 years of experience in developing and executing engineering and science projects for government agencies and the private sector to characterize offshore environmental sites. My experience includes riverine, lacustrine, estuarine, and coastal processes involving hydrodynamics, waves, sediment, and contaminant transport.

The City of Long Beach (City) has been working with the USACE since 2010 to advance a feasibility study to restore the East San Pedro Bay. My understanding is that the East San Pedro Bay Ecosystem Restoration Study is the first open ocean ecosystem restoration study to be conducted by the USACE under their feasibility study guidelines. Generally, the goals of the project are to restore aquatic habitat of sufficient quality and quantity to support diverse resident and migratory species. Additionally, there is a goal to improve water circulation sufficient to support and sustain aquatic habitat within East San Pedro Bay (ESPB). My review is focused on the adequacy of the feasibility study in evaluating habitats, their relationship to natural processes in ESPB, and measures for restoration of those habitats.

The USACE has completed a Draft Integrated Feasibility Report (IFR), which includes an Environmental Impact Statement/Environmental Impact Report for the

ESPB Ecosystem Restoration Feasibility Study [1]. The Draft Report is available for public review through January 27, 2020. Following the close of the public review period the USACE and the City will prepare a Final Report, incorporating all comments received. In the attached review, the ESPB restoration goals are examined, habitats that have been identified are reviewed, and the alternatives are reviewed. A summary of review findings is presented at the end.

Project Goals

The project was conceived when the City requested federal partnership from the USACE to address the aquatic ecosystem restoration opportunities within ESPB. Under Section 206 of the Water Resources Development Act of 1996 the U.S. Army Corps of Engineers is granted the authority to undertake restoration projects in aquatic ecosystems such as the ESPB. The USACE evaluates restoration projects that benefit the environment through restoring, improving, or protecting overall aquatic habitat. The USACE entered a partnership with the City to conduct the IFR study and supporting work.

The USACE Planning guidance notebook [2] provides specific objectives for restoration projects. Specifically, the guidance defines:

> *The objectives of ecosystem restoration is to restore degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition.* ***Restored ecosystems should mimic, as closely as possible, conditions which would occur in the area in the absence of human changes*** *to the landscape and hydrology. Indicators of success would include the presence of a large variety of native plants and animals, the ability of the area to sustain larger numbers of certain indicator species or more biologically desirable species, and the ability of the restored area to continue to function and produce the desired outputs with a minimum of continuing human intervention.*

As stated above, the overall intent of restoration is to partially or fully reestablish a more natural condition which would occur in the area in the absence of humans (bold statement above). Pursuant to this, the ecosystem restoration study should include examination of the naturally occurring ecosystem in the ESPB project area, problems contributing to the ecosystem degradation, and of means for ecosystem

restoration. The USACE guidance and objectives for restoration inform the basis of the review herein.

In the IFR [1], the overall project goal for the ESPB restoration is:

> *Restore and improve aquatic ecosystem structure and function for increased habitat biodiversity and ecosystem value of the SCB within the Proposed Project Area of ESPB.*

Leading to the specific USACE ESPB restoration planning objective:

> *Restore and support the sustained functioning of imperiled aquatic habitats such as kelp, rocky reef, coastal wetlands, and other types historically present in San Pedro Bay of sufficient quality and quantity to support diverse resident and migratory species within ESPB during the period of analysis (50 years)*

The USACE identified key restoration opportunities within the ESPB focusing on high value and degraded habitats. These opportunities include leveraging existing open and undeveloped areas in the project area available for restoration to provide ecosystem functions and increased biodiversity in ESPB within the regional setting of the Southern California Bight (SCB). Multiple opportunities were identified for kelp, wetland, rocky intertidal, and sandy island habitat.

As will be discussed below, these opportunities and alternatives do not focus on key habitats that are present within the ESPB prior to human changes and are still present in the system today, such as sandy beach, sandy intertidal, and sandy subtidal habitats. Furthermore, the IFR overall weights high-value habitat within the entire SCB, but the weighting of all SCB habitats doesn't adequately evaluate the habitat dominant in the original ESPB natural system (primarily sand). A significant change in the system habitat composition is generally termed habitat enhancement. Enhancement incorporates ecosystem features, that while perhaps high value, were not historically significant in the project area. Since the primary goal of USACE guidance is, "to restore degraded ecosystem … to a less degraded, more natural condition," the IFR project goals to increased habitat biodiversity and ecosystem value based on evaluation of the entire SCB is more accurately an enhancement than a restoration of ESPB.

It is widely acknowledged that the USACE alternatives had to incorporate a number of planning constraints and considerations including:

- Avoid negative impacts to U.S. Navy's operations including activities in support of national security and other missions.
- Do not significantly reduce operational capacity for the ports, THUMS oil extraction islands or other existing maritime operations.
- Do not allow for infilling any of the energy island borrow pits located within the ESPB boundary.

These constraints pose significant barriers to the restoration of ESPB to conditions prior to human change; however, striving for those conditions should be a primary objective of the restoration alternatives and their evaluation.

Project Setting

The SCB extends more than 370 miles from Point Conception (USA) to Punta Banda (Mexico) and supports some of the most diverse and highly productive coastal ecosystems in the U.S. The SCB is a dynamic region where the cold California Current flows south to mix with the warm north flowing Davidson Counter-current [3]. Overall, it is agreed that the ESPB restoration represents an unparalleled opportunity to support a unique and ecologically productive part of the Pacific Ocean. Pursuant to this, it is important to understand and evaluate the habitats through the historic context of what a sub-region of the SCB, such as the ESPB, naturally supported. Without an understanding of the natural baseline habitat, any restoration or enhancement activities risk unintended consequences.

Figure 1 illustrates the USACE defined project and study areas. The ESPB project encompasses the semi-enclosed bay/estuary offshore of Long Beach from the Los Angeles River to Seal Beach. The project area today includes a wide array of subtidal and intertidal habitats. The focus of the project is to restore scarce coastal and marine habitat types that have been lost or imperiled due to port development, urbanization, and associated activities within the project area [1]. In contrast to the ESPB project area, the overall study area encompasses a much larger region extending west past the Port of Los Angeles to the point Fermin Lighthouse. The range of habitats naturally supported in the study and project areas prior to development differ. The study area habitats significantly varied due to the transition in coastal geomorphology from a cliff backed shoreline to the west to

open sandy beach to the east. The ESBP project area coastline was primarily sandy beach with inland wetlands/coastal lagoons.

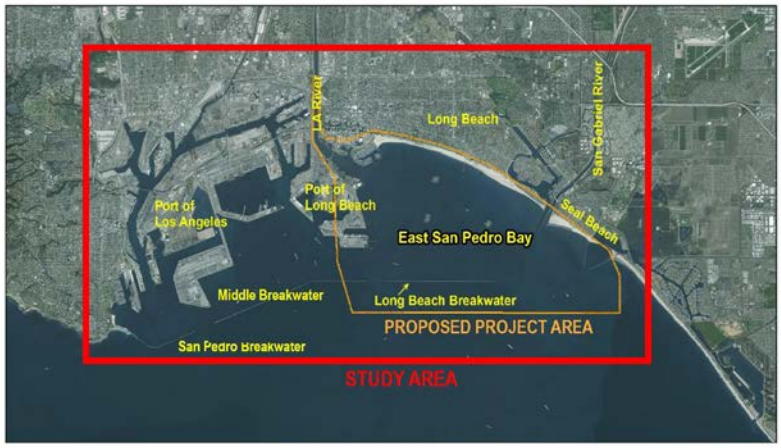


Figure 1. Project and study area as defined by the USACE (IFR, 2019).

In the IFR kelp, rocky reef, coastal wetlands, and other habitat types have been identified in SCB as supporting diverse resident and migratory species within the region. Identified ecosystem stresses to the area have included loss of historic coastal wetlands and sensitive marine habitat areas with associated nursery, reproductive, and other ecological functions; and reduced abundance and biodiversity of marine populations as a result of habitat loss. The identified stresses to the ecosystems are human induced including coastal and offshore development resulting in a loss of kelp extents, rocky reef, wetlands, and eelgrass. Sandy intertidal is not included in the IFR habitat discussion.

The region around the Palos Verdes Peninsula has lost over half of the kelp habitat resulting in substantial fish biomass decreases. As seen in Figure 2, the stressed kelp habitats are in rocky cliff backed shoreline regions along the Peninsula. The cliff backed shoreline is common to geomorphic regions supporting kelp habitat along the California coast. The regions of kelp habitat loss, while tragic for the overall SCB, are not located within the study or project areas. The IFR does not address that this highly valued habitat targeted for restoration was not of significance historically in the ESPB project area. It is important to assess the potential for the unintended consequences of restoring a kelp habitat that was not naturally occurring in the project area.

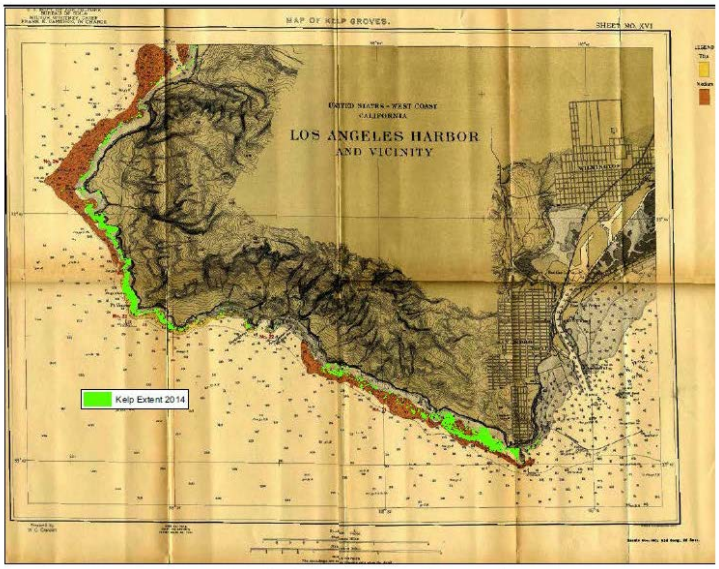


Figure 2. Kelp loss from historic (brown) to current (green) extents.

According to the IFR, wetlands in the San Pedro Bay historically accounted for 80% of all wetland habitat in southern California. Construction of infrastructure (e.g., breakwaters) and filling of wetlands during the development of the ports and harbor severely decreased existing wetland and sandy coastal habitat quantity and quality. The human induced stresses to ecosystem functions continue to this day. The wetland habitat has been reduced by 93% due to human changes to the system [1]. As seen in Figure 3, the vast majority of wetland habitat has been filled or transitioned to port and harbor subtidal waters. Unfortunately, given the constraints in the project area, there is limited opportunity to restore wetland habitat.

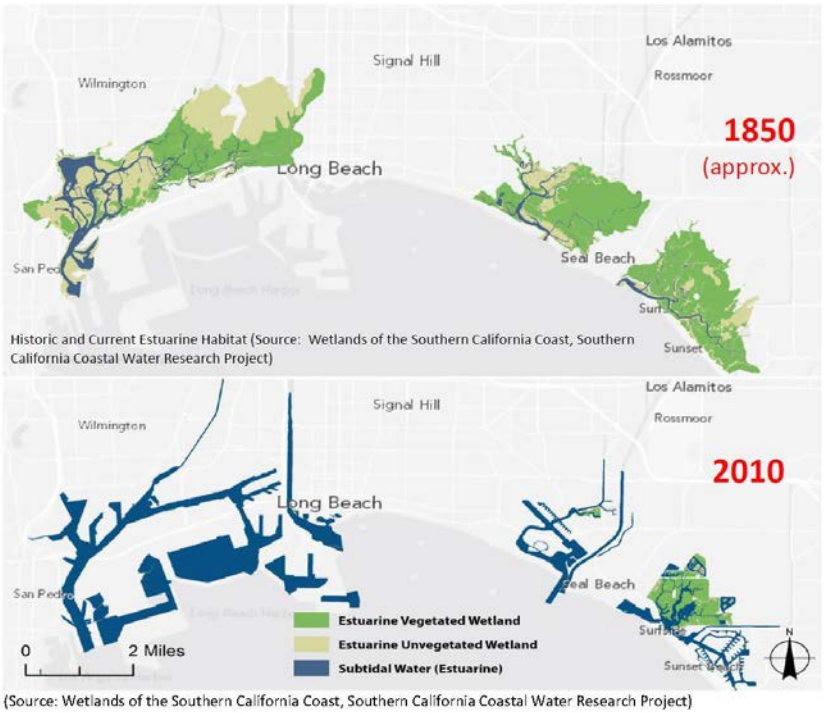


Figure 3. Historic and current estuarine habitat in San Pedro Bay region.

What is clear in Figure 3 and available 19th century maps is that the ESPB project area was dominated by sandy coast. Wide, sandy beaches concentrated adjacent to river mouths or where features retain sand (e.g., headlands) are a common, yet sensitive, geomorphic and habitat feature in southern California [4, 5]. Beaches are an invaluable ecological, social, economic, and cultural resource in southern California. Favorable weather and ocean conditions, combined with the high population density of the region, have resulted in these beaches becoming the most popular recreation destination.

The sandy beaches are a key coastal habitat that is has been highly vulnerable to human induced change[1]. The Coastal Conservancy has noted that over 60% of beaches statewide are threatened. Sediment transport is a key process that provides critical support for the health of beaches. The Los Angeles and San Gabriel Rivers have been disrupted due to development resulting in loss of annual sand sized sediment load to the project area beaches. Sediment deposits within the region are

[1] https://data.cnra.ca.gov/dataset/41afe0c6-3471-4a9b-85ed-2a6e3380f197/resource/42611842-269f-4a7c-815c-06687741474b/download/scmpa-24-final-report.pdf

no longer replenished with fresh, clean, coarse sands on an ongoing basis. In addition, presence of structures (e.g., breakwaters) further disrupt sediment transport and the wave dynamics responsible for maintaining these beaches. Presently, beach nourishment is required to sustain this valuable ecologic, social, and human resource in ESPB making the sandy beaches an important habitat to consider in any restoration study.

The subtidal sand, intertidal swash zone, and upper beach are critical components of the sandy beaches that are not included in the IFR. While the upper beach is generally above the intertidal, except during large storm events, it is an important component of a complete coastal habitat evaluation. As noted in the IFR study, sandy islands, a proxy for beach habitat, are a scarce habitat for threatened and endangered shorebirds.

Overall, the IFR assesses and values multiple habitats throughout and outside of the study area. Unfortunately, some of these habitats were not naturally dominant in the project area and a key habitat in the specific project area, sandy beaches, are not specifically included in the study. While the study aims to enhance ecosystem features that did not naturally exist in the project area, it omits important habitat associated with a sandy coast that is important both historically and present day.

Alternatives Evaluation

The USACE performed a comprehensive formulation of alternatives based on stakeholder input. Habitat restoration measures were screened according to USACE evaluation criteria including effectiveness, efficiency, and acceptability metrics. Habitat measures included kelp, rocky reef, eelgrass, wetland, oyster reef, and sandy island. Additional restoration measures included evaluating breakwater modifications. As discussed, the omission of sandy beach habitat represents a significant omission in any complete assessment of habitat measures. Therefore, measures such as breakwater modifications that support sandy habitats overall, were not linked to any habitat unit. While the sandy island habitat provides similar ecosystem services, restoration of existing sand habitat by breakwater modification is not evaluated. This deficiency will be discussed further below.

Generally breakwater modifications, either lowering, notching, or removal, allow more for wave energy and circulation in the project area similar to the historic

natural system [1]. With breakwater modification, the USACE modeling found that there were significant wave height increases from existing conditions. The wave height increases result in increases of downtime for maritime operations in the area. Coincident with the wave height increases, the IFR found that fine sediment would be eroded in favor of coarse sand sediment. The increased wave action would also result in shoreline configuration changes and possible widening zones of erosion. The habitat unit (HU) score for the breakwater modifications were deemed to be zero. The breakwater modifications were concluded as the highest cost with zero restoration benefit.

The evaluation of the breakwater removal did not include any scoring of the restorative benefits to the natural sandy bottom and beach habitats. The removal of fine sediment in favor of coarse sediment benthos is restorative to the historic ESPB ecosystem; however, the HU score was zero for these restoration activities. Furthermore, the decreased flushing time (e.g., particle residence time) evaluated in the IFF improves water quality and circulation that is beneficial to all of the habitats being evaluated. By not scoring the range ecosystem benefits, the IFR prematurely screens out breakwater modifications.

The Southern California Coastal Bay Ecosystem Model habitat model used for the IFR considers the entire SCB. The metrics/goals of increasing total habitat area, diversity, and connectivity are therefore scored for a much larger region than the project area. As discussed previously, the inclusion of habitat outside of the project area provides inequitable habitat values for habitat not naturally occurring in the project.

Alternative 8 is the only alternative carried forward to the final array that incorporates any sandy habitat through the sandy islands. As stated in the IFR, the habitat is valuable for threatened and endangered shorebirds. Also, Alternative 8 gains the most restored and enhanced acreage over the largest number of sensitive habitat types. However, Alternative 8 is screened out. Alternative 4a, the final selected alternative and primarily achieves enhancement of kelp, intertidal, and rocky reef habitat that was not dominant in ESPB before human change to the system. Alternative 4a has no restoration of the dominant existing sandy habitat. While the IFR states that the study avoids valuing one type of habitat over another, the historic sandy habitats are not equitably evaluated in the study.

The scoring systems used in the IFR does not account for all of the process linkages across measures and metrics. For example, the breakwater removal measures are not linked to benefits to other habitats through the support of healthy benthos and water quality. Furthermore, the IFR does not assess the potential consequences of significantly increasing the acreage of new habitat. Increased kelp and rocky intertidal habitat could reduce circulation and negatively impact water quality in the region. These new habitats could also decrease water clarity and sediment sizes at the beach which would result in degradation of a substantial recreational resource. The IFR must include a full assessment of the potential negative consequences of increasing the quantity of new habitat in the area before selecting an alternative.

Summary

While the IFR presents a comprehensive evaluation of restoration feasibility in ESPB, the opportunities and alternatives assessed do not focus on key habitat that was present prior to human changes, is still present, and stressed today (e.g., sandy beach, sandy intertidal, and sandy subtidal habitats). The significant change in the system habitat composition resulting from Alternative 4a is generally termed habitat enhancement. Since the primary goal of USACE guidance is, "to restore degraded ecosystem … to a less degraded, more natural condition," the IFR project goals to increased habitat biodiversity and ecosystem value based on evaluation of the entire SCB is more accurately an enhancement than a restoration of ESPB. Furthermore, the IFR does not examine the consequences of expanding new habitats in the ESPB.

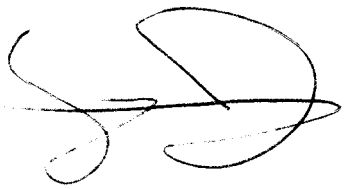
The review of the IFR highlights several key concerns:

- The range of habitats naturally supported in the study and project areas prior to human development are different. The study area habitats significantly varied due to the transition in coastal geomorphology from a cliff backed shoreline to the west to open sandy beach to the east. The ESBP project area coastline was primarily sandy beach with inland wetlands/coastal lagoons.
- The subtidal sand, intertidal swash zone, and upper beach are critical habitats locally that are not included in the IFR evaluation.

- While the study aims to enhance ecosystem features that did not naturally exist in the project area, it omits habitat associated with a sandy coast that is important both historically and present day.
- Without an understanding of the natural baseline habitat in ESPB, any restoration or enhancement activities risk being ecologically incompatible and risk unintended consequences.
- By not scoring all ecosystem restoration benefits, such as support of sandy habitat and circulation, the IFR prematurely excludes reasonable and practicable breakwater modifications.
- While the IFR states that the study avoids valuing one type of habitat over another, the historic sandy habitats are not equitably evaluated in the study.
- The IFR must include a full assessment of the potential negative consequences of increasing the quantity of new habitat.

We appreciate this opportunity to provide the USACE with this review. Please let me know if you need any further information.

Sincerely,



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Principal Marine Scientist

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