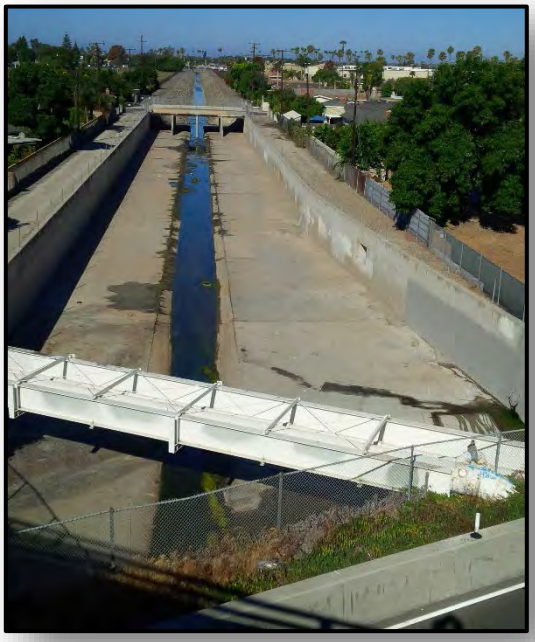
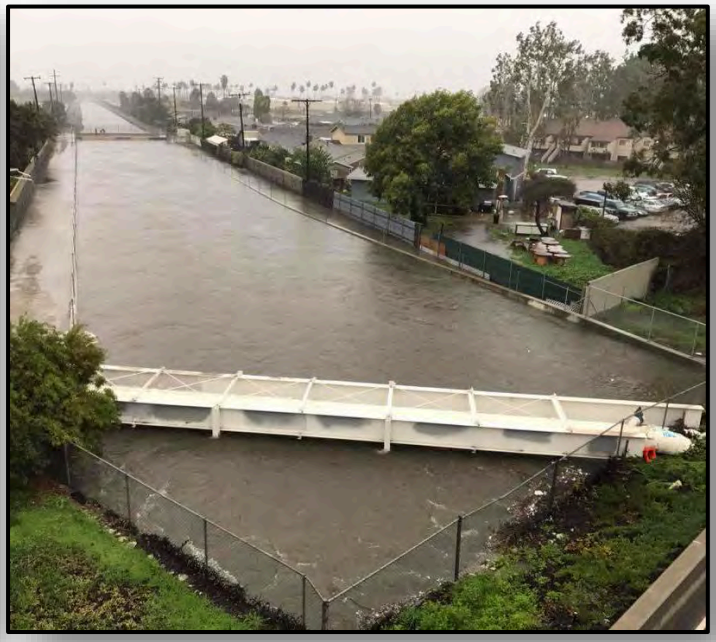
APPENDIX K – U.S. FISH AND WILDLIFE SERVICE PLANNING AID LETTER (PAL)

For

WESTMINSTER, EAST GARDEN GROVE FLOOD RISK MANAGEMENT STUDY





October 2018

U.S.ARMY

US Army Corps of Engineers®
Chicago District

COUNTY OF ORANGE CALIFORNIA

Page intentionally left blank

Appendix K – U.S. Fish and Wildlife Service Planning Aid Letter (PAL)

Contents

1.0 Planning Aid Letter (PAL) 4

Page intentionally left blank

1.0 Planning Aid Letter (PAL)

Page intentionally left blank

From:	Avery, Jon
To:	Herleth-King, Shawna S CIV USARMY CELRC (US)
Cc:	Carol Roberts; Jonathan Snyder; Davis, Susanne J CIV USARMY CELRC (US); Padilla, Michael C CIV CELRC CELRD (US)
Subject:	[Non-DoD Source] Fish and Wildlife Coordination Act PAL for the proposed Westminster East Garden Grove Flood Risk Management Project
Date:	Tuesday, July 24, 2018 3:51:59 PM
Attachments:	image.png image.png image.png

Shawna,

This email is our first Planning Aid Letter (PAL) for the Westminster East Garden Grove Flood Risk Management Project (Project). Over the last year we have provide to the U.S. Army Corps of Engineers Corps, Chicago District (Corps) verbal (by phone) and written suggestions by email. In previous years we provided email and verbal comments and suggestions on early design concepts to Corps LA District and local sponsor. The project is currently proposed as a general concept and set of alternatives. Due to our workload constraints and the planning timing needs of the Corps we are not sending you this PAL as a formal letter; this email equivalently functions and suffices as a normal letter (PAL) pursuant to the Fish and Wildlife Coordination Act (FWCA). The non-Federal sponsor for the Corps is Orange County Public Works (OCPW).

As part of coordination under the FWCA, the U.S. Fish and Wildlife Service (Service) has prepared this PAL for the Corps with the primary goal of describing issues and opportunities related to the conservation and enhancement of fish and wildlife resources. As noted below, Federal water resources development projects are required to give conservation of fish and wildlife equal consideration with other project purposes. The project, as proposed, would involve flood risk management (flood damage reduction) measures in the watershed of Westminster in and near the communities Garden Grove and Westminster, Orange County, California.

The purpose of the Corps' feasibility study for the proposed Project is to evaluate "residual" flood risk within the Westminster Watershed, located in southern California. This risk is residual after the completion of channelization improvements of the Santa Ana River and the subsequent removal of the Westminster Watershed from the Santa Ana River floodplain. The flood risk to human structures and within the Westminster watershed can be attributed to the combination of development within the watershed (e.g., impervious surfaces in non floodplain areas) and well as development within floodplains (e.g., structures constructed in the floodplain). The current configuration of remnant streams, floodplains, and drainage channels collect runoff generated within the watershed and convey storm runoff and flows from the watershed to the Pacific Ocean. The study area floodplain region is the reportedly the only area within Orange County that remains within the Federal Emergency Management Agency percent Floodplain. Reported analysis indicates that approximately 20,000 structures currently remain in the project area floodplain and are at flood damage risk from a 1 percent storm event, with a reported estimated expected annual damages of $40,000,000.

The goal of the project alternatives is to reduce flood hazards, including risks to human life, safety, and damages to private structures and public infrastructure, from the design storm event (1 percent recurrence) flooding along the Westminster channels, and to reduce flood impacts in the vicinity of Outer Bolsa Bay, including flooding along Pacific Coast Highway, from the same design storm event. The Westminster watershed is approximately 74 square miles in area and includes urbanized areas in the western corner of Orange County. The watershed lies on a

relatively flat coastal plain, and is almost entirely urbanized with residential and commercial development. The watershed is part of the former floodplain of the Santa Ana River, which historically meandered throughout much of the existing watershed as far north as Anaheim Bay. Channelization and large scale flood damage reduction structures have now constrained the Santa Ana River to the river's main stem on the eastern border of the Westminster watershed.

This PAL is provided in accordance with the FWCA of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 et seq.), the Endangered Species Act (ESA) of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 et seq.). This PAL does not constitute the report of the Secretary of the Interior as required by section 2(b) of the FWCA, nor does it constitute a biological opinion under section 7 of the ESA. The purpose of this PAL is to deliver recommendations for use by the Corps and local design/planning teams in developing goals, objectives, and alternatives for the project.

Fish and Wildlife Coordination Act

The FWCA directs and authorizes consultation, reporting, consideration, and in many cases, installation/implementation of fish and wildlife conservation features. The authorities of the FWCA are considered to be “supplementary legislation” to the various Federal project authorizations, such as the Corps public works authorizations (Smalley and Mueller 2004). The FWCA conditions or supplements other water development statutes to require consideration of recommendations generated under the FWCA procedures, including portions of the Clean Water Act (Zabel v. Tabb, 430 F2d 199 [5th Cir. 1970] cert. denied 401 U.S. 910 [1972]). For Federal water resources development projects, the FWCA requires that fish and wildlife conservation receive equal consideration by Federal agencies with other project purposes, and that such conservation be coordinated with other project features. The FWCA authorizes the project implementation of means and measures for both mitigating losses of fish and wildlife resources, and for enhancing these resources beyond offsetting project effects (Smalley and Mueller 2004).

Project Area and Biological Resources

The proposed project action area would involve portions of Orange County inland within 15 miles of the coast of the Pacific Ocean. These upland, wetland, and open water areas have been heavily modified over the last century associated with agricultural, military, commercial, and urban development of Orange County. The potential project direct footprint and nearby areas includes civil engineering and commercial/urban development structures. Much of the project is related to historically natural streams that were partially channelized, relocated, and/or ditched for agricultural development in the 20th century. These channels were then further channelized to varying levels when urban development in the Westminster watershed subsequently occurred; particularly fast development growth in the region occurred in the 1950s and 1960s. Orange County's human population expanded from 131,000 in 1930 to 1,900,000 in 1980 (Jepson 2001). The Westminster watershed is now essentially built out with development, with relatively little remaining natural community areas.

The project area is focused around select non-Federal drainage channels within the Westminster watershed and the receiving waters of one of the project channel systems within the Bolsa Chica Ecological Reserve area. These channels within the Westminster Watershed collect local runoff and vary in size, geometry, and lining. Typical channel configurations include concrete rectangular (including lined invert); riprap-lined trapezoidal (soft-bottomed), concrete-lined trapezoidal (including lined invert), and enclosed culverts. Configurations vary by reach and change throughout the channel systems.

The project watershed cities (Anaheim, Stanton, Cypress, Garden Grove, Westminster, Fountain Valley, Los Alamitos, Seal Beach and Huntington Beach) are located in Orange County. The general project area is backed by low bluffs and mesas, and lowland areas that historically held extensive wetlands. Two mesas occur within Huntington Beach: Bolsa Chica Mesa to the north and Huntington Beach Mesa to the south. These mesas are separated by the Bolsa Chica Gap, which includes Bolsa Bay and the Bolsa Chica wetlands. North of the Bolsa Chica Mesa is the Sunset Gap with Anaheim Bay and Huntington Harbour.

The Westminster watershed drainage has two main channel systems that collect runoff from portions of the cities of Anaheim, Stanton, Cypress, Garden Grove, Westminster, Fountain Valley, Los Alamitos, Seal Beach and Huntington Beach: the East Garden Grove-Wintersberg Channel, with its principal tributary, the Ocean View Channel, drain into Outer Bolsa Bay; and the Bolsa Chica Channel, with its tributaries, the Anaheim-Barber City Channel and Westminster Channel, drain into Huntington Harbour. The current sole ocean outlet for both Outer Bolsa Bay and Huntington Harbor (and thus, the subject channels) is to the north at Anaheim Bay. It is very likely that before development of Pacific Coast Highway and other development of the area that Bolsa Bay and Huntington Harbor would, during mid to large storm events (and resulting high water elevations in the estuaries), episodically break through and erode portions of the relatively narrow barrier beach that separated these water bodies from the Pacific Ocean in some locations, and temporarily flow flood waters and sediment into the ocean. These barrier beaches would then naturally/seasonally re-form, with substantial subsurface flows between the ocean and these estuaries very likely continuing under/through the porous barrier beach matrix with each tidal cycle.

The channels within the Westminster watershed collect local storm water runoff and vary in size, geometry, and lining. Typical channel configurations include concrete rectangular (including lined invert); riprap-lined trapezoidal (soft-bottomed), concrete-lined trapezoidal (including lined invert), and enclosed culverts. Configurations vary by reach and change throughout the channel systems. The East Garden Grove-Wintersburg Channel (EGGWC), noted above, is an approximately 11.8 mile long regional floodcontrol facility in north/central Orange County that is characteristic of most of the project channels. The EGGWC is currently regarded as the largest flood threat to human structures in Orange County. The EGGWC system was reportedly designed and built in the 1960s to convey 65 percent of the 25-year peak discharge (approximately a 10-year storm event). In some reaches this channel is trapezoidal and lined with rip-rap. Most of project channel reaches are channelized, relatively narrow with steep armored slopes, and perennially wet with open water and little native woody vegetation. Very little off-channel/upland refugia with native plant cover exists within any project channel reach. As such, these channels quite artificial and depauperate in plant and wildlife diversity and numbers compared to natural streams with adjacent intact floodplain and upland natural communities. Nevertheless, these channels typically support substantial numbers of shorebirds and waterbirds, and likely considerable aquatic resources. The lower reaches of some project channels have a muted tidal influence.

The Bolsa Chica Ecological Reserve is an approximately 1,341-acre (sometimes listed as 1,445-acre) coastal estuary reserve located in Huntington Beach. As noted above, its location is at the downstream terminus of some of the proposed project channels. The property is owned by the State Lands Commission and managed by the California Department of Fish and Wildlife. This area was part of the historic Rancho La Bolsa Chica Mexican land grant. The Bolsa Chica Ecological Reserve boundaries are roughly Warner Avenue to the north, Seapoint Avenue to the south, Pacific Coast Highway to the west, and residential developments to the east. The East Garden Grove Wintersburg Channel runs through the Reserve. The Newport-Ingelwood fault runs through the reserve. Historically, the site was used for oil and natural gas production.

Bolsa Chica is a coastal lowland area between two mesas, the Bolsa Chica Mesa and the Huntington Beach Mesa. Bolsa Chica, which a century ago was under

full tidal influence, has started to come full circle. Over 100 years ago, Bolsa Chica was diked-off from direct tidal influence but remained below mean sea level, becoming heavily influenced by freshwater and acted as a sump for local drainage. In 1978, restoration began on the State's Ecological Reserve, and muted tidal influence was restored to the Inner Bolsa Bay area. At that time, two small islands, North Tern Island and South Tern Island, were created for nesting California least tern (Sternula antillarum browni = Sterna a. b.), a State and Federal endangered species. In 1997, the Bolsa Chica lowlands were acquired into public ownership. This marked the beginning of a multi-agency effort to design, evaluate, and implement a plan for restoring the fish and wildlife habitats. These habitats had been cut off from the ocean for a century and have been an operating oil field for over 50 years. Construction of the restoration project began in fall 2004 and was completed in August 2006. By the 2006 breeding season, three new nest sites were available for nesting and augmented the pre-existing North and South Tern Islands in Inner Bolsa Bay. The new ocean inlet, referred to as the Full Tidal Basin, was opened after the conclusion of the breeding season in August 2006. The Full Tidal Basin is now subject to water level rise and fall that approximates the unequal semi-diurnal tidal range of southern California's ocean waters. The Muted Tidal Basin was

opened to tidal influence from the Full Tidal Basin through its water control structures in March 2008.

Within Bolsa Chica, 317 acres were restored as fully tidal areas; these areas very likely continue to require substantial tidal exchange to ecologically function at high integrity levels, including support of marine fish. Since completion in 2006, the Bolsa Chica inlet has nearly closed at least once, and tidal water exchange is often muted due to sediment shoaling inside the inlet. This has resulted in a smaller volume of ocean water exchanged during the tidal cycle, a narrower tidal range, and likely reduced wetland ecological functions within the restored tidal areas. In 2009, 2011, and 2015 inlet dredging events restored or improved tidal connectivity at tidal basin of Bolsa Chica.

Fish

The open waters of Huntington Harbor and Bolsa Bay provide habitats for a variety of fish and invertebrate species that utilize these sheltered waters either during early growth or throughout their lives. Due to the repeated periodic dredging disturbance and lack of vegetation and natural shallow water features/complexity within Huntington Harbor, the number of fish species using the harbor is likely smaller than in nearby Anaheim Bay or Bolsa Bay; however, some of the commonly found fish in these waters include the deep body anchovy (Anchoa compressa), jacksmelt (Atherinopsis californiensis), topsmelt (Atherinops affinis), and Pacific staghorn sculpin (Leptocottus armatus). In addition, Anaheim Bay is an important nursery area for Pacific halibut (Hippoglossus stenolepis) and

diamond turbot (Hypsopsetta guttulata). Some juvenile fish very likely utilize the harbor area. Typical aquatic invertebrates found in these waters likely include bay mussel (Mytilus trossulus), acorn barnacles (Sessilia sp.), and tunicates (Tunicata).

Many marine fish species require coastal wetland habitats such as estuaries to complete at least a portion of their life cycle. The vegetative edge of the wetlands is important for many species of foraging juvenile fish as it provides cover for predator avoidance (Herbold et al. 2014). Research indicates that small fish, such as California killifish (Fundulus parvipinis) were able to consume six times more food in marsh habitats than in habitats with no marsh access (West and Zedler 2000). Madon (2008) found that food consumption rates of topsmelt (Atherinops affinis) were 50 percent lower when the tidal inlet at Los Peñasquitos (San Diego County, California) is closed. In addition, halibut are normally affected by closures due to their sensitivity to higher temperatures in less flushed systems. Nearly every fish species captured during post-2006 monitoring conducted at Bolsa Chica was represented by juvenile size classes and usually adults, demonstrating the role of the basin as nursery habitat for spawning or post-larval settlement and rearing (Merkel & Associates 2013). Following restoration in 2006, the fish community in Bolsa Chica was abundant, diverse, and contained biomass levels equivalent to the relatively unaltered Upper Newport Bay and the larger San Diego Bay (Farrugia et al. 2014). Over five years of quarterly monitoring, a total of 52 fish species have been observed within the fully tidal areas at Bolsa Chica (Merkel & Associates 2013). Commercially desirable species found at Bolsa Chica include white seabass (Atractoscion nobilis) and California halibut (Merkel & Associates 2013). Fodrie and Levin (2008) found that about 58 percent of juvenile halibut in southern California had embayment origins in 2003 and 2004, and that lagoon-type habitats such as Bolsa Chica provided nurseries for 16 percent of halibut in 2004. While most of the fish common in southern California bays, lagoons, and estuaries are low in trophic level (Zedler 1982), the species composition within the fully tidal portions of Bolsa Chica currently includes coastal marine fishes from 3-4 trophic levels, including top predators such as leopard shark (Triakis semifasciata), brown smooth-hound (Mustelus henlei), gray smooth-hound (M. californicus), and bat ray (Myliobatis californica). These relatively large fish act as moderate energy links that transfer nutrients among coastal areas (Farrugia et al. 2014).

In contrast, closed and severely muted systems (including some wetland project areas behind levees) are dominated by species with a salinity tolerance generally greater than seawater (approximately 35 parts per thousand), including various gobies (Gobiidae), California killifish, and topsmelt (Merkel & Associates 2009; MEC Analytical Systems 1993); these species, however, are also known to be resident within southern California embayments including open systems (Zedler 1982). Species within closed systems also include those that occur in stagnant water and/or are tolerant of poor water quality and elevated temperatures, such as non-native Western mosquitofish (Gambusia affinis), rainwater killifish (Lucania parva), and sunfish (Centrarchidae) (Wetland Research Associates 1994; MEC Analytical Systems 1993).

Overall, the habitats within the fully tidal portions of Bolsa Chica support more complex habitats and higher biodiversity/integrity than the nearby wetland areas of closed or severely muted tidal systems. Significant areas of eelgrass and cordgrass have expanded in the fully tidal areas within the Bolsa Chica after the 2006 restoration activities (Merkel & Associates 2013). Extensive eelgrass meadows increase the complexity of the system as they support resident fish species, provide egg-laying substrate and protection for breeding species, perform essential ecosystem functions, and form the basis of detritus- and grazing-based food webs (Merkel & Associates 2013; Bernstein et al. 2011). These structured habitats provide good conditions for fish species such as croaker (Sciaenidae), surfperch (Embiotocidae), kelpfish (Chironemidae), and seabass (Sciaenidae) (Merkel & Associates 2013). In contrast, the restricted tidal influence and periodic water quality extremes of the nearby closed or highly muted systems the aquatic communities to a small number of rather hardy species.

Natural Communities

The beaches, lowlands, bluffs, and mesas of Westminster and Huntington Beach are largely developed and landscaped, with some remaining ruderal and disturbed areas. A few limited areas continue to support natural communities; these support a variety of native plants and animals. These natural communities include remnants of coastal strand, coastal salt marsh, freshwater marsh, and associated (albeit limited) riparian scrub and woodlands. Most open areas otherwise consist of ruderal areas, structures, and landscaped ornamental zones. Within Bolsa Chica are open water, mudflats, salt marsh, coastal dunes, seabird nesting islands, riparian, and freshwater marsh. More than 200 bird species have been identified at Bolsa Chica.

Coastal Sand Dunes and Coastal Strand: The coastal strand plant communities, found on undisturbed sandy beaches and dunes above the high tide level, are divided into beach and dune communities. Few plants are adapted to survive the harsh conditions of the sandy beaches and dunes due to winds carrying sand and salt, shifting infertile sandy soil, and human disturbance. A few remaining vestiges of the original vegetation remain in and near the project area, consisting of plants such as sea rocket, beach-primrose, and beach morning-glory. Non-native species such as New Zealand spinach, and several species of ice plant, have aggressively pioneered in areas that have been disturbed. Remnants of dunes along Pacific Coast Highway (PCH) and near the Huntington Beach Wetlands support several shrub species. These dune shrubs are a mixture of native and non native species. Among the natives are three species of willow (Salix sp.), two species of Baccharis, and lemonade berry (Rhus integrifolia). Non-natives include various species of saltbrush, ice-plant (Carpobrotus sp.), castor bean (Ricinus communis) and myoporum (Myoporum laetum). Typical low growing plants include coastal goldenbush (Isocoma menziesii), western goldenrod (Solidago lepida), heliotrope (Phacelia sp.), beach primrose (Chamissonia cheiranthifolia), and saltgrass (Distichlis spicata).

Where the dune-salt marsh plant communities meet; spiny rush (Juncus acutus) and bulrush (Scirpus robustus) form dense stands in some areas (as between Brookhurst Street and Magnolia Street) while coastal goldenbush forms nearly pure stands in others (e.g., Brookhurst Street at PCH). Other plants associated with this transitional zone are western goldenrod (Solidago lepida), yerba mansa (Anemopsis californica) and saltgrass.

Coastal strand provides habitats to to a variety of reptiles, birds and mammals. Reptiles are limited in both species diversity and abundance in the coastal strand community, and amphibians generally do not occur. The side-blotched lizard (Uta stansburiana) is plentiful in the area away from the outer beaches, and the San Diego (southern) alligator lizard (Elgaria multicarinata webbii) may be found in small numbers in the remnant dune areas. Considering the consistent surrounding human presence, birds are the only vertebrates within the project area coastal strand communities that are currently normally abundant.

Many species of shorebirds and gulls use the upper beach as loafing areas and the intertidal zone and inshore waters for foraging. One species, the California least tern typically nests on exposed beaches where, in southern California, it is often placed in direct competition with human beach users for breeding sites. Associated with increased human use of beaches in California and modifications of river mouths, least tern populations declined significantly over the last several decades. California least terns are federally-listed as endangered. Least terns traditionally nested on sand flats in southern California river mouths as well as beaches; most of these river mouths are now heavily modified and no longer support nesting habitat for least terns. Least terns formally used the nearby mouth of the Santa Ana

River and continue to utilize zones adjacent to the mouth of Talbert Channel and at Bolsa Chica in the project area. Several landbirds such as the rock dove (Columba livia), American crow (Corvus brachyrhynchos), house finch (Carpodacus mexicanus), American kestrel (Falco sparverius), and loggerhead shrike (Lanius ludovicianus) utilize the upper beach. In summer, Bolsa Chica hosts breeding colonies of numerous tern species, including reportedly the largest colony of elegant terns (Thalasseus elegans) in the U.S.

Western snowy plovers (Charadrius alexandrines nivosus) are federally-listed as threatened and utilize areas in and near Bolsa Chica. Snowy plover nesting areas within Bolsa Chica include: Seasonal Ponds (Cells 2 through 13), Future Full Tidal Basin (Cells 14 through 40 and Cell 63), Muted Tidal Basin (Cells 41 through 50 and Cell 66), North Tern Island (NTI), South Tern Island (STI), Nest Site 1 (NS1), Nest Site 2 (NS2), Nest Site 3 (NS3), and the Levee Roads of the Full Tidal Basin (Figure 2). Snowy plovers likely use some additional areas in the vicinity of the Bolsa Chica, particularly as habitat for foraging or loafing. Those areas are the ocean beach immediately to the west at Bolsa Chica State Beach, Outer Bolsa Bay, Rabbit Island, and Inner Bolsa Bay to the west of West Levee Road with the exception of NTI and STI. Poor reproductive success resulting from human disturbance, subsidized predation, and inclement weather, combined with permanent or long-term loss of nesting habitat to urban development has led to the decline in active nesting colonies as well as an overall decline in the breeding and wintering population of the western snowy plover along the Pacific coast of the United States. In southern California, the very large human population and the resultant beach recreation activities by humans have precluded the western snowy plover from breeding in several historically used beach strand areas.

Coastal Salt Marsh, Estuarine Open Water, and Mudflat: Plants of the coastal salt marsh community grow along the upper reach of the coastal estuarine community where they receive only periodic inundation by sea water. Freshwater streams often flow through this community in the project area and serve to dilute the salinity of the seawater. The salt marsh community embodies several distinct components: pickleweed marsh, salt flat, saltwater channel, saltwater pond, and a disturbed component. The dominant plant is common pickleweed (Salicornia bigelovii). Other common plants include fivehook bassia (Bassia hyssopifolia), spear saltbush (Atriplex joaquiniana), saltgrass, and to a lesser extent, alkali health (Frankenia salina). Areas of higher elevation may have been subjected to periodic off-road vehicle traffic and are invaded by ruderal (or non-native weedy) species.

Tidal influence extends upstream into both the CO2/CO4 and CO5/CO6 channel systems. The tidal influence within the CO2/CO4 channel systems extends through the CO2 channel, past the CO2/CO4 confluence and approximately 1.5 miles into the CO4 channel. The tide gates located at the downstream end of the CO5 channel systems are not currently functional and tidal influence extends approximately 2.5 miles upstream of the tide gates. The channel segments subject to tidal influence in both channel systems are soft bottom channels with open water, mudflat, and established high function salt marsh vegetation in some areas. Outer Bolsa Bay has some shallow water areas and mud flats zones that are ecologically important aquatic resources.

Grassland: The undeveloped portions of the Bolsa Chica Mesa and other upland areas to the west of the Bolsa Chica lowlands support degraded grassland communities. Most of the grassland species are exotic, having been introduced to the region during the Spanish Colonial period, and competitively favored by disturbance (including historic heavy grazing). Species common to the grasslands here include bromes (Bromus sp.), mustard (Brassica sp.), filaree (Erodium sp.), Russian-thistle (Salsola tragus), and cardoon (Cynara cardunculus). Some native species persist in these areas, including needlegrass (Nassella sp.), owl's clover (Castilleja sp.), and mariposa lily (Calochortus sp.).

Freshwater Marsh, Freshwater Open Water, and Riparian: Elements of these natural communities are found within the project area in soil depressions and channels that have surface fresh water for at least part of the year, and in coastal plains near permanent slow-moving or ponded waters. Some wetland plants occur in ponds or stream channels; others float upon deep water, but most thrive at the open water margins where the soil occurs within a few feet of the water surface. Typical plants are cattails (Typha sp.), rushes (Juncus sp.), spike-rushes (Eleocharis sp.), duckweed (Lemna sp.), Douglas' water hemlock (Cicuta douglasii), and water smartweed (Pesicaria amphibian). Growing in low elevation sandy soils along freshwater waterways are small areas of medium to large trees and shrubs that can form dense or linear stands. In such communities are Fremont cottonwood (Populus fremontii), arroyo willow (Salix lasiolepis), sandbar willow (Salix exigua), and mulefat (Baccharis salicifolia).

Portions of both main project channel systems upstream of the tidally influenced segments include soft bottom channels with important areas of open water, mudflat, vegetated marsh, and some riparian communities. Upstream of the tidally influenced zone in the project's lower channels, about 3.3 miles of soft bottom channel occur within the CO5 channel, approximately 1.8 miles occur within the CO6 channel, and approximately 3.0 miles occur within the CO4 channel. Some portions of CO2/CO4 and CO5/CO6 channel systems have sediments deposited on concrete-lined channel inverts. This material and associated vegetation have be periodically removed in the past as part of channel maintenance by OCPW or eroded by larger storm flow events. Some relatively small vegetated areas are also scattered along other project channel segments within small pockets of deposited sediment in rip rap sections.

Landscaped Ornamental: This community includes areas of ornamental and non-native trees, shrubs, and ground cover associated with urban development is common in areas surrounding much of the proposed project footprint. These plant associations are artificial, perpetuated by cultural activities. For instance, Eucalyptus groves are located within portions of the Bolsa Chica area and other project area locations. Also included are mowed lawns comprised of various non-native grasses, ornamental groundcover, shrubs, and trees.

Ruderal: Ruderal vegetation is found in areas frequently disturbed such as oil production areas or along roadsides, such as along Warner Avenue east of Warner Avenue bridge at Bolsa Chica. Typically, the dominant plant species are highly adaptive and invasive plants, commonly considered to be roadside weeds; however, a few native distrubance-adapted plant species occur in these areas. Typical native plants are California croton (Croton californicus), telegraph weed (Heterotheca grandiflora), pineapple weed (Amblyopappus pusillus), and tarweeds. Introduced plants are scarlet pimpernel (Anagalis arvensis), wild oats (Avena sp.), bromes, mustards, filarees, foxtail barley (Hordeum sp.), cheeseweed (Malva sp.), sweet-clovers (Melolitus sp.), Russian-thistle, and tocalote (Centaurea melitensis).

Listed/Sensitive Species

Several listed or sensitive species have substantial potential to occur in the project study area, based on our preliminary research of the project area. These species include salt marsh bird’s-beak (Cordylanthus maritimus ssp. maritimus), San Diego button-celery (Eryngium aristulatum var. parishii), Ventura marsh milk-vetch (Astragalus pycnostachyus var. lanosissimus), California seablite (Suaeda californica), southern tarplant (Centromadia parryi australis), coast woolly-heads (Nemacaulis denudata var. denudata), California least tern, coastal California gnatcatcher (Polioptila californica californica), least Bell’s vireo (Vireo bellii pusilus), Ridgway’s rail (Rallus obsoletus levipes), western snowy plover, Belding's savannah sparrow (Passerculus sandwichensis beldingi),

California brown pelican (Pelicanus occidentalis californicus), burrowing owl (Athene cunicularia), osprey (Pandion haliaetus), northern harrier (Circus cyaneus), white tailed kite (Elanus leucurus), peregrine falcon (Falco peregrinus anatum), two-striped garter snake (Thamnophis hammondii), silvery legless lizard (Anniella pulchra pulchra), green sea turtle (Chelonia mydas), San Diego fairy shrimp (Branchinecta sandiegonensis), and wandering skipper (Panoquina errans). Within the likely project action the highest potential locations for these species to occur are within the Bolsa Chica Ecological Reserve and environs, and within wetted portions of the project channel systems. Professional evaluations and surveys for these species would be appropriate as part of project planning.

Of these species, California least tern (federally-listed as endangered) and western snowy plover (federally-listed as threatened) have relatively high potential to be affected by project construction and/or operations/maintenance of the various alternatives, particularly by activities that involve open water (e.g., dredging of Bolsa Bay), unvegetated flats, mudflat, beach, levees in or near Bolsa Chica, or shoreline zones. The area currently occupied by Huntington Harbor/Anaheim Bay/Bola Chica lagoon and environs formerly likely included several small undeveloped islands, barrier beaches, and beach/stream mouth sand spits. These islands and spits likely included unvegetated beach and ephemeral open areas and flats that historically supported California least terns and western snowy plovers. California least terns typically nest in colonies on relatively open beach areas near prey (small fish in open water areas) and that are mostly free of vegetation. Sand spits, dune-backed beaches, beaches at creek and river mouths, and salt pans at lagoons and estuaries are the main coastal habitats for nesting western snowy plovers.

Recommendations

We have three main recommendations per the FWCA for the proposed project:

1) We suggest that a design alternative be developed that provides for moving storm flood flows from Bolsa Bay directly to the Pacific Ocean. This would function similar to how the historic barrier beach at this location would naturally "blow out" to the ocean during flood events; this very likely occurred episodically prior to development of the area over the last century. This suggested design would likely incorporate a new bridge or a series of culverts under Pacific Coast Highway between Bolsa Bay and the ocean, as well as limited annual winter sand removal on the beach side fronting the bridge/culvert structure (in a rectangular swath to the upper beach shore) to about a foot above mean high high water level; this sand removal would be to provide for effective sand barrier breaching and erosion by Bolsa Bay flood waters, while maintaining typical human beach uses in the area on the beach side of the new bridge/culvert 99 percent of the time. By design, when water levels in Bolsa Bay are high during flood events (e.g., 10 percent storm and larger) the sand barrier to the ocean would be passively overtopped and eroded. This project feature would not function as a surface flow tidal channel to Bolsa Bay (and not function as a new ocean outlet), except for a short-term period following breaching; the barrier beach would build back up relatively quickly and naturally over the following year through littoral sand flow and wave action along the shore. The concept here is to eliminate the costs/need/impacts to modify/expand the Warner Avenue bridge and dredge Bolsa Bay to increase flood carrying capacity. Additionally, this bridge or culvert structure would be soft-bottomed, so as partially restore subsurface tidal flows between Bolsa Bay and the ocean that are currently blocked by the compacted soils of Pacific Coast Highway and packing lot subgrades. One of these culverts could also function to provide pedestrian and bicycle access under Pacific Coast Highway. See Figure 1 below.

2) We suggest that soft-bottom channels with the project channels that are proposed to be modified or eliminated (e.g., through channel lining) be retained in location and extent, wherever practicable. Retention of soft-bottom channels has substantial ecological value and would reduce project ecological impacts and the needs for associated offsetting mitigation as compared to proposed fully armored/lined channels. In most locations where project

channels are below design flood capacity and heavily constrained by adjacent development, we suggest that channels cross-sections be expanded through the use of vertical channel walls and incorporation of the footprint for channel access/maintenance roads into the channel itself (e.g., such roads would be above low-flow water levels but incorporated into the channel). In these constrained-width areas and where channel access is desired during flood events (such as for swift-water rescue activities), we suggest that only one access road be retained within proposed channel designs, in order to gain channel width. This single access road would be along the top of the channel bank (as is typical), above design high-flow water level; the often-utilized second access road along the opposite channel side would be eliminated from proposed designs. If a second access road on the adjacent side of the channel is necessary in proposed designs, it should be incorporated into the channel cross-section (to be normally flooded during storm flow events, but dry during low flows) in order to gain capacity space through increased channel horizontal channel section width.

3) We suggest that ecological restoration, mitigation for channel/dredging/bridge impacts, and increases in channel flood capacity be collectively achieved through creation of an approximately 125-acre restoration site immediately north of channel CO2, within the Naval Weapons Station Seal Beach. The main hydrological goal of this site would be restoration of both flood and low flows to the re-created historic floodplain in this area. The existing levee, boundary fencing, and access road along the Weapons Station/channel boundary would be retained, but a series of culverts would be incorporated into the existing levees to divert a portion of low and flood flows (about 50%) to and from this area of the historic floodplain on lands within the Weapons Station that are currently used for an agricultural lease. This lease is reportedly up for renewal soon. These culverts would be designed to prevent human access to the Weapons Station. Directing flood flows into and through this site would increase the effective capacity of the associated CO2 channel system to carry flood flows. This restoration area would be surrounded by new levees, as necessary, to prevent damage from flooding of adjacent lands on the Weapons Station. The restoration area would be graded to provide appropriate ground elevations and hydrology for a mix of open water, mud-flat, freshwater marsh, salt marsh, and riparian scrub natural communities commensurate with the site potential and areas affected by the project. Construction permission and access would require negotiation of construction and maintenance easements from the Weapons Station. A formal contaminants site and railroad in the area can likely be effectively avoided by the restoration activities.

This suggested restoration would cause the loss of some agricultural lease lands on the Weapons Station. Since the ecosystem associated with these channels (and most of Orange County) is heavily lacking in ecologically-intact floodplain areas, adding this restoration component to the project would go very far in making up for overall project biological impacts and would improve flood risk management, as the restoration site would increase floodwater holding-carrying capacity for the system. Negotiating the easement and access for this work with the Navy could be difficult, including access for future maintenance. The vast majority of the restoration area would normally not be subject to any maintenance (e.g., vegetation or sediment management) as part of O&M. Maintenance issues would likely remain minor over several decades, and mostly focused on removing debris from the culverts. Almost all of the new set-back levees on the Weapons Station around the restoration site would not be subject to high velocity flood flows (and thus damage) due to protection afforded them by the new, wide floodplain area. See Figure 2 below.

4) We recommend that levees associated with channel CO5 within Bolsa Chica that are no longer essential for flood risk management be removed, particularly when considering the proposed relocation of the tide gates on channel CO5 to an upstream location. It is expected that known contaminant sites within Bolsa Chica would likely need additional armoring for protection from flood risks as a result. Removal of these levees would restore tidal flow to substantial areas of Bolsa Chica that are currently subject to partially or severely muted tidal flow, as well as restore more natural estuarine flow conditions. This may also reduce or eliminate the need for dredging within Bolsa Bay and widening of the Warner Avenue bridge, as currently proposed. See Figure 3 below.

Thank you,

Jon Avery

Project Alternatives as Currently Proposed by the Army Corps

Alternative 1 – No Action

Flooding will continue throughout the Westminster watershed due to the insufficient capacity of the existing channel systems. Outer Bolsa Bay will continue to flood during frequent storm events, impacting traffic on Pacific Coast Highway. The oil wells in the Bolsa Chica Ecological Reserve will remain at risk of inundation by flows that break out of the CO5 channel upstream of the reserve and travel overland into the Muted Tidal Basin and Seasonal Pond area.

Alternative 2 - Nonstructural

Measures that are included in the nonstructural alternative are floodplain regulation, emergency response, evacuation planning, flood warning system, and removal of impediments to flow.

Floodplain Regulation: This measure seeks to regulate floodplain uses in order to minimize current and future damages by controlling construction activities and land use. This measure utilizes political and/or social controls to minimize land use activities which are incompatible with floodplain conditions, while maximizing more compatible uses such as recreation, open space, habitat, and parking. Examples of floodplain regulation tools include master plans, zoning controls, and building codes.

Emergency Response: This measure involves the development of an emergency plan that provides for dispatch of emergency services and a framework within which local agencies would operate during a flood event.

Evacuation Planning: This measure involves the development of an emergency plan that provides for the physical removal of residents of the floodplain on a temporary basis in the event of a flood.

Flood Warning System: This measure would facilitate the evacuation of flood prone areas during larger storm events.

Removal of Impediments to Flow: This measure involves the removal of vegetation, sediment, and other debris that can accumulate in the channel and interferes with the conveyance of flood flows. Removal may involve mechanical or human actions.

Alternative 3 – In-Channel Modification (Minimum Channel Improvements)

This alternative will reduce flood risk within the watershed by improving conveyance efficiency of existing channels. Trapezoidal channels within CO2, CO4, CO5, and CO6 that currently have an earthen bottom and either earthen or riprap channel banks would be lined with concrete. There would be no alteration to portions of the channels that are rectangular in shape and lined with concrete, nor to portions of the channels with in-channel box and pipe structures. Additionally, the tide gates on CO5 would be replaced in order to improve the flow conditions through the lower reaches of the CO5 channel. The current tide gates leak and therefore allow saltwater to intrude upstream in CO5. This saltwater influence extends upstream from the tide gates on CO5 approximately 2.5 miles. The replacement of the tide gates as part of this alternative would still allow for this tidal influence into the lower reaches of CO5. Lastly, this alternative also includes the widening of the Outer Bolsa Bay channel just upstream of the Warner Avenue Bridge. Widening of the channel would require that the Warner Avenue Bridge and the pedestrian bridge at the Bolsa Chica Conservancy be widened as well. Widening of the Outer Bolsa Bay channel would improve conveyance of flow through the region and the hydraulic efficiency of the lower reaches of the CO5 channel.

Alternative 4 – In-Channel Modification (Medium Channel Improvements)

This alternative will reduce flood risk within the watershed by improving conveyance efficiency and capacity of existing channels. This alternative is a hybrid between Alternatives 3 and 5. Alterations to CO2, CO4, CO5, and CO6 would be done on a reach by reach basis and could include a combination of 1) lining trapezoidal channels that currently have an earthen bottom and either earthen or riprap channel banks with concrete, 2) converting trapezoidal channels with earthen bottom and either earthen or riprap channel banks to rectangular shaped channels lined with concrete, and 3) addition of floodwalls. This alternative would also include the replacement of the tide gates on CO5 and the widening of the Outer Bolsa Bay Channel, Warner Avenue Bridge, and the Bolsa Chica Conservancy pedestrian bridge.

Alternative 5 - In-Channel Modification (Maximum Channel Improvements)

This alternative will reduce flood risk within the watershed by improving conveyance efficiency and capacity of existing channels. Trapezoidal channels within CO2, CO4, CO5, and CO6 will be replaced with rectangular concrete channels to contain a 100 year storm. Additionally, floodwalls could be constructed in the existing channel right of way where necessary. This alternative would also include the replacement of the tide gates on CO5 and the widening of the Outer Bolsa Bay Channel, Warner Avenue Bridge, and the Bolsa Chica Conservancy pedestrian bridge.

Figure 1. (above)

Figure 2 (above)

Figure 3 (above)

++*+