

ATTACHMENT

Ballona Creek Low Flow Treatment Facility Alternative Discharge Analysis

prepared for:

City of Los Angeles, Bureau of Sanitation, Watershed Protection Division

prepared by:

Larry Walker Associates, MBC Applied Environmental Sciences, Paradigm Environmental, and Somach Simmons and Dunn



Table of Contents

1	<i>Introduction</i>	1
2	<i>Background on Ballona Creek</i>	2
2.1	Ballona Creek Watershed Waterbodies	4
2.2	Beneficial Uses.....	7
3	<i>Regulatory Framework</i>	9
3.1	MS4 Permit.....	9
3.2	Applicable TMDLs and Implementation Schedules	9
3.3	Time Schedule Order.....	12
4	<i>Flow and Water Quality Assessment</i>	13
4.1	Modeling Approach	13
4.2	Data Reviewed for Critical Condition Analysis	14
4.2.1	Ballona Creek Dry Weather Flow Rates	14
4.2.2	Downstream Storm Drains and Sepulveda Channel	14
4.3	Results.....	15
4.4	Summary of Flow and Water Quality Assessment	18
5	<i>Biological Assessment</i>	18
5.1	Ballona Creek and Estuary.....	19
5.2	Del Rey Lagoon	19
5.3	Ballona Wetland Ecological Reserve	20
5.4	Freshwater Wetland System	20
5.5	Ballona Species of Interest	21
5.6	Biological Assessment Summary.....	24
6	<i>Overview of Regulatory Requirements</i>	24
7	<i>Summary</i>	26
8	<i>References</i>	27

List of Tables

<i>Table 1. Waterbodies Associated in the Ballona Creek Watershed</i>	4
<i>Table 2. Ballona Creek Watershed Designated Beneficial Uses as Presented in the Los Angeles Region Basin Plan</i>	8
<i>Table 3. TMDLs Applicable to the Ballona Creek Watershed</i>	9
<i>Table 4. Interim and Final TMDL Compliance Milestones Applicable to the Ballona Creek Watershed</i>	10
<i>Table 5. QUAL2K Scenarios for Critical Condition Analysis and Simulated Concentrations</i>	17
<i>Table 6. Sensitive species known to occur in the project area</i>	22
<i>Table 7. Summary of Potential Reviewing Agencies Permits and Approvals Associated with Ballona Creek Treat and Release or Diversion Scenarios</i>	25

List of Figures

<i>Figure 1. Jurisdictional Boundaries for the Ballona Creek Watershed Management Group</i>	3
<i>Figure 2. Waterbodies within the Ballona Creek Watershed</i>	5
<i>Figure 3. Flow Duration Curve for Ballona Creek at Sawtelle Avenue (near LFTF-1).</i>	14
<i>Figure 4. Results of Critical Conditions Analysis: E. coli Concentrations at Outlet of Ballona Creek Reach 2 with Increased Downstream Flows under Different LFTF-1 Treatment Rates</i>	17

List of Appendices

<i>Appendix 1. Summary of Sensitive Species and Habitats in the Ballona Creek Area and Associated References</i>	
--	--

Executive Summary

One of the most challenging dry weather requirements is to attain the limits of the Ballona Creek Bacteria Total Maximum Daily Load (TMDL), which were incorporated into the 2012 MS4 Permit (Order No. R4-2012-0175; National Pollutant Discharge Elimination System [NPDES] Permit No. CAS004001). As of the final compliance date of April 27, 2013 the dry weather requirements of TMDL are not being met, meaning that exceedances of receiving water limitations (RWLs) occur during most monitoring events. To address potential MS4 Permit compliance issues, the cities of Los Angeles, Beverly Hills, Culver City, Inglewood, and West Hollywood, the County of Los Angeles and Los Angeles County Flood Control District (LACFCD), referred to as the TSO Participants, requested and were granted a Time Schedule Order (TSO) by the Regional Board on May 14, 2015. The TSO requires that specific actions be taken to comply with the TMDL by December 15, 2019. The strategy to comply with the dry weather TMDL requirements and the TSO is primarily based on completing three regional projects that cover approximately 90% of the watershed:

- Low Flow Treatment Facility 1 (LFTF-1) located in Ballona Creek Reach 2
- Low Flow Treatment Facility 2 (LFTF-2) located in Sepulveda Channel
- Mesmer Low Flow Diversion located in Centinela Creek

The City of Los Angeles' Bureau of Sanitation (LA Sanitation) evaluated three possible options for operating LFTF-1, which would be the City's largest dry weather runoff project. The three approaches for LFTF-1 are: (1) to treat-and-release Ballona Creek flows back to the Ballona Creek channel, (2) divert Ballona Creek flows to the Hyperion Water Reclamation Plant (HWRP) for treatment and beneficial reuse to offset potable water demand, and (3) a hybrid approach of treat-and-release and diversion to HWRP. In order to evaluate the potential effect of the approaches and support next steps related to decision-making, this report presents (1) background on the watershed and the regulatory framework and (2) an assessment of the potential effect of the options on flow and water quality, biological resources, and the regulatory requirements.

The potential options to treat-and-release, divert 100% of Ballona Creek flows to HWRP for beneficial reuse, or a hybrid approach are not expected to affect any of the sensitive species known to occur in the Ballona Creek watershed. The selected option for LFTF-1 is ultimately a balance between the desired certainty that WQOs will be attained at the outlet of Ballona Creek Reach 2 and the desire to utilize flows for potential reuse at HWRP. With 3 MGD of treatment at LFTF-1, WQOs could be attained under baseline critical conditions and 6 MGD of treatment could support attainment even if assumed baseline loading downstream of LFTF-1 increased by 54%. There are differences in regulatory requirements among the potential options, with a primary consideration being that any diversion to HWRP may involve water rights permitting via the State Board and consultations and approvals by resource agencies regarding sensitive species. The process of gaining approval to meet the regulatory requirements can take a varying degree of time to complete and may affect the implementation schedule for LFTF-1. The hybrid scenario realizes the benefits related to both water quality (attainment of the TMDL) and water resources (offsetting potable supply through re-use at HWRP).

1 Introduction

In June 2006, the Los Angeles Regional Water Quality Control Board (Regional Board) adopted a Basin Plan Amendment (BPA) establishing the Ballona Creek Bacteria Total Maximum Daily Load (Bacteria TMDL). The TMDL became effective in May 2008. The TMDL was amended in June 2012 and the amendment became effective on July 2, 2014. The requirements of the TMDL were incorporated into the 2012 MS4 Permit (Order No. R4-2012-0175; National Pollutant Discharge Elimination System [NPDES] Permit No. CAS004001). These requirements included receiving water limitations (RWLs) based on the TMDL targets, water quality based effluent limitations (WQBELs) based on the TMDL waste load allocations (WLAs), as well as a schedule to attain the RWLs and WQBELs. The final compliance date to attain the RWLs and WQBELs during dry weather was April 27, 2013.

Due to the challenging nature of addressing bacteria in urban runoff and the waterbodies within the Ballona Creek watershed, the RWLs have not been met. To address potential MS4 Permit compliance issues, the cities of Los Angeles, Beverly Hills, Culver City, Inglewood, and West Hollywood, the County of Los Angeles and Los Angeles County Flood Control District (LACFCD), referred to as the TSO Participants, requested and were granted a Time Schedule Order (TSO) by the Regional Board. The TSO, effective from May 14, 2015 to December 15, 2019, essentially provides regulatory relief so long as the specific actions identified in the TSO are taken to bring the MS4 Permittees into compliance with the RWLs and WQBELs.

The MS4 Permittees' strategy to comply with the dry weather TMDL requirements and the TSO is primarily based on completing three regional projects that cover approximately 90% of the watershed:

- Low Flow Treatment Facility 1 located in Ballona Creek Reach 2
- Low Flow Treatment Facility 2 located in Sepulveda Channel
- Mesmer Low Flow Diversion located in Centinela Creek

The City of Los Angeles (City) Bureau of Sanitation (LA Sanitation) is evaluating three potential approaches to utilize the existing North Outfall Treatment Facility (NOTF) located next to Ballona Creek Reach 2 as a Low Flow Treatment Facility (LFTF-1) to comply with the dry weather bacteria TMDL requirements as identified in the TSO. The three potential approaches for LFTF-1 are: (1) to treat instream flows and release treated water back to the receiving waters, (2) divert instream flows to the Hyperion Water Reclamation Plant (HWRP) for treatment and beneficial reuse to offset potable water demand, and (3) a hybrid approach of treat-and-release and diversion to HWRP. These approaches have different effects on water quality. The treat-and-release approach returns relatively clean water back to Ballona Creek which improves downstream water quality, while the diversion approach reduces Ballona Creek flow rates. All three approaches require regulatory processes and approval from various agencies, including the Regional Board.

In order to evaluate the potential effect of the approaches and support next steps related to decision making, this report presents background on the watershed and the regulatory

framework and presents an assessment of the potential effect of the options on flow and water quality, biological resources, and the regulatory requirements.

2 Background on Ballona Creek

The Ballona Creek watershed is approximately 128 square miles in area and comprises the cities of Beverly Hills and West Hollywood, and portions of the cities of Los Angeles, Inglewood, Culver City, and Santa Monica, as well as unincorporated areas of the County of Los Angeles. Additionally, the Los Angeles County Flood Control District (LACFCD) owns and operates drainage infrastructure within incorporated and unincorporated areas in the watershed. **Figure 1** provides a map of the watershed boundaries and the delineations of the jurisdictions of the MS4 permittees and other entities within the watershed.

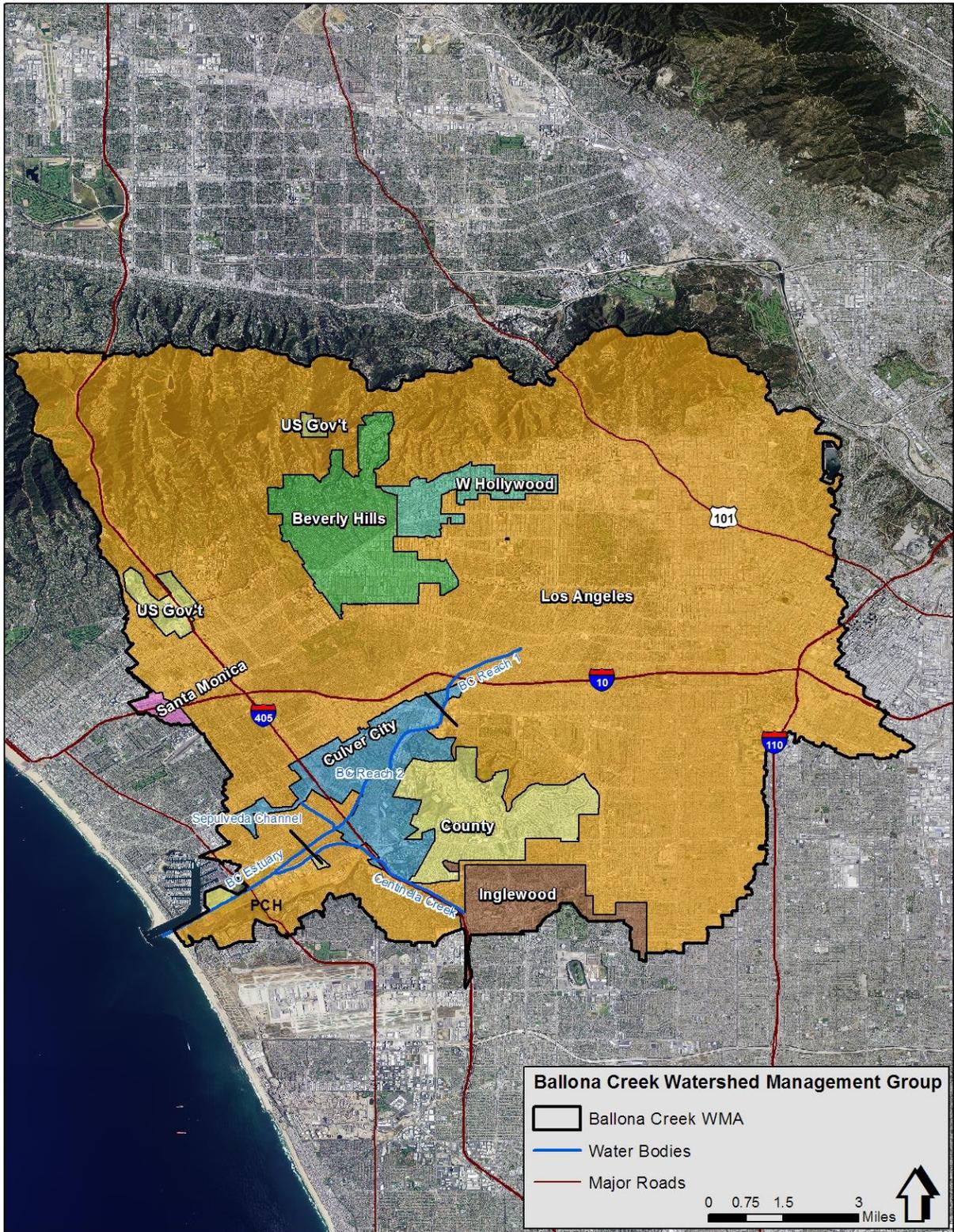


Figure 1. Jurisdictional Boundaries for the Ballona Creek Watershed Management Group

2.1 Ballona Creek Watershed Waterbodies

The Ballona Creek watershed contains a number of fresh and salt water waterbodies, which are presented in **Table 1**. Ballona Creek is an open channel for approximately 10 miles. Reaches 1 and 2 make up the freshwater portion of this 10-miles stretch. Below Reach 2, Ballona Creek becomes an estuary and reaches the Pacific Ocean at Playa del Rey. Ballona Creek originates from storm drains above Cochran Avenue. These storm drains, and the additional tributaries that meet up with Ballona Creek (Sepulveda Canyon Channel and Centinela Creek), drain the watershed. During dry weather, flows in Ballona Creek upstream of Ballona Creek Estuary (Estuary) average approximately 14 cubic feet per second (cfs); however, during a 100-year storm event, these flows can reach 36,000 cfs (LARWQCB and USEPA, 2005).

Reach 1 (above National Boulevard) is the most northern portion of Ballona Creek. It stretches two miles from Cochran Avenue in Los Angeles, where it stems from a network of underground storm drains, to National Boulevard in Culver City. It is channelized with vertical concrete walls and base (Monitoring Plan Subcommittee 2009, LARWQCB and USEPA 2005). Reach 2 (which extends from the Estuary to National Boulevard) is four miles long and ends at Centinela Ave. It is also channelized with concrete walls and base. The Estuary runs three and a half miles from Centinela Avenue to the Pacific Ocean at Playa del Rey. The Estuary portion of Ballona Creek has sloped concrete or riprap and concrete banks, and unlike Reaches 1 and 2, this section of Ballona Creek has a soft bottom and features tidal exchange. Sediments accumulate at the base of the sloped banks in areas with riprap. The freshwater in this section comes from upstream Reaches 1 and 2, and from Centinela Creek (including water diverted through the Ballona Freshwater Marsh), which is mainly storm-drain run off (LARWQCB and USEPA 2005, BCWVG 2014).

Major tributaries to Ballona Creek include Sepulveda Channel (tributary to Reach 2) and Centinela Creek (tributary to Ballona Creek Estuary). Note that although Benedict Canyon Channel is identified in the Bacteria TMDL as a tributary to Ballona Creek, it is a closed channel that daylight where the channel meets Ballona Creek and is not identified in the Basin Plan as a waterbody in the watershed. As such, it is not considered a tributary other than for the purposes of addressing the bacteria TMDL for the watershed.

Other water bodies in the watershed that are hydrologically linked to the Ballona Estuary include the Del Rey Lagoon, which is connected through a tide gate, and the Ballona Wetland Area B, which is connected through an open channel (**Figure 2**).

Table 1. Waterbodies Associated in the Ballona Creek Watershed

Mainstem	Associated Waterbodies
Ballona Creek Reach 1	
Ballona Creek Reach 2	Sepulveda Channel
Ballona Creek Estuary	Centinela Creek Channel
Lagoons and Wetlands and Other Areas of Interest	
Del Rey Lagoon	Ballona Creek Wetlands (Areas A, B, and C)
Riparian Corridor	Ballona Freshwater Marsh



Figure 2. Lower Portion of the Ballona Creek Watershed

Del Rey Lagoon is a small saltwater pond with a 40-ft wide levee separating it from the Estuary section of Ballona Creek (**Figure 2**). A tide gate at the northern end of the lagoon is manually operated to control water flow between Del Rey Lagoon and the Estuary. The City of Los Angeles is the responsible agency for lagoon management and maintaining water exchange in the Del Rey Lagoon. Water exchange with the Ballona Creek Estuary occasionally happens during periods of very high (spring or king) tides, when the tidal elevation is higher than the elevation of the tide gate (Josselyn et al. No date). The Del Rey Lagoon receives freshwater runoff inputs from an area of approximately 25 acres adjacent to the lagoon.

The Ballona Creek Wetlands encompass approximately 626 acres (541 acres of wetlands area and 85 acres of roads, parking lots, levees and other structures). Approximately 460 acres of the Ballona Wetlands are located within the Ballona Creek watershed and the remaining portion is located in the Marina Del Rey watershed. The wetlands are identified as three separate areas (A, B, and C) (**Figure 2**). Wetland Area A, located in the Marina del Rey watershed, is north of Ballona Creek and southwest of Lincoln Boulevard. This area

encompasses almost one-hundred and forty acres. Area A is relatively high in elevation and not affected by tidal influence. Area A is comprised mainly of upland scrub and grassland, with an area of seasonal wetland that does not receive flow directly from Ballona Creek (Johnston et al. 2012). Area B is low-lying and tidally influenced through an open channel to the Ballona Creek Estuary. This section of the Ballona Wetlands is south of Ballona Creek and west of Lincoln Boulevard. The total area of Wetland Area B is approximately three-hundred and forty acres. The surface area of tidal inundation into Ballona Wetland Area B is approximately 5.95 acres, (determined by measuring areal extent at full tidal inundation) and varies depending on tidal height (Johnston et al. 2012). Area C is located north of Ballona Creek and encompasses sixty-six acres in the Marina del Rey watershed. It is relatively high in elevation and is not affected by tidal influence. Area C consists mainly of upland scrub and grassland with a small area of seasonal wetland that does not receive flow directly from Ballona Creek. This area also contains Little League baseball fields (Johnston et al. 2012).

The Ballona Wetlands are owned and/or managed by the California Department of Fish and Wildlife (CDFW) and the State Land Commission. Much, but not all of the Ballona Creek Wetlands are included in a management area referred to as the Ballona Wetland Ecological Reserve (BWER). The BWER is a 600-acre reserve adjacent to Ballona Creek that includes wetland and upland habitats, as well as seasonal wetlands. The tidal area of Area B accounts for 1% of the BWER's 600 acres and are considered 'non-wetland waters;' a designation that also includes the Ballona Creek Estuary and saltpans. These 'non-wetland waters' total 83 acres of the BWER (Johnston et al. 2012). The largest portion of wetland habitat in the BWER is characterized by saline soils that form seasonal wetlands following winter storms. One-hundred and fifty three acres (25%) of the BWER are designated as wetland habitat (Johnston et al. 2012, Friends of Ballona Wetlands 2015).

The Freshwater Wetland System is adjacent to but not part of the BWER and includes two habitats (Riparian Corridor and Ballona Freshwater Marsh) that are hydrologically linked together. Both components were designed and constructed to provide water quality improvements and management of stormwater for the nearby Playa Vista development (Green 2012) and drain approximately 1,040 acres (440 acres of the Playa Vista development and 600 acres of off-site areas) (Read 2010). The Riparian Corridor is two miles long and runs along the base of the Westchester Bluffs (Friends of Ballona Wetlands 2015). This 25-acre freshwater habitat receives a flow of at least one cfs of treated ground water.

The Ballona Freshwater Marsh was constructed in 2003 and is hydrologically connected to the Riparian Corridor. The Fresh Water Marsh covers 26 acres and runs along the southern side of Jefferson Boulevard and western side of Lincoln Boulevard. It shares a border with the eastern side of Wetland Area B in the BWER (Friends of Ballona Wetlands 2015). A culvert under Lincoln Boulevard connects the Freshwater Marsh to the Riparian Corridor, from which most of the freshwater in the marsh is supplied. In addition, two inlets allow surface flow from the surrounding areas into the Fresh Water Marsh. An outlet from the Fresh Water Marsh drains into Ballona Creek Estuary to prevent flooding in the Marsh area. In the event of extreme storm flow, a spillway and sluice gate were installed to prevent an over-flow of fresh water from the Marsh into the adjacent Ballona Wetlands Area B (Read 2010).

2.2 Beneficial Uses

Table 2 presents the designated beneficial uses in the Ballona Creek watershed as described in the Water Quality Control Plan, Los Angeles Region (Basin Plan). The Regional Board carries out its CWA responsibilities through the state's Porter-Cologne Water Quality Control Act and establishes water quality objectives designed to protect beneficial uses contained in the Basin Plan.

Table 2. Ballona Creek Watershed Designated Beneficial Uses as Presented in the Los Angeles Region Basin Plan

Water Body	REC1	LREC-1	REC2	HFS	MUN	NAV	COMM	WARM	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET ^b
Ballona Creek Estuary (ends at Centinela Creek) ^{c,w}	E		E			E	E		E	E	E	E ^e	E ^f	E ^f	E	
Ballona Lagoon ^c	E		E			E	E		E	E	E	E ^e	E ^f	E ^f	E	E
Ballona Wetlands ^c	E		E						E		E	E ^e	E ^f	E ^f		E
Del Rey Lagoon ^c	E		E			E	E		E		E	E ^e	E ^f	E ^f		E
Ballona Creek Reach 2 (Estuary to National Blvd.)	P ^{s,au}	E	E	Y ^{av}	P*			P			P					
Ballona Creek Reach 1 (Above National Blvd.)	P ^{s,au}		E	Y ^{av}	P*			P			E					

E: Existing beneficial use

P: Potential beneficial use

b: Waterbodies designated as WET may have wetlands habitat associated with only a portion of the waterbody. Any regulatory action would require a detailed analysis of the area.

c: Coastal waterbodies which are also listed in Coastal Features Table (2-3) or in Wetlands Table (2-4) of the Basin Plan. Ballona Lagoon, while listed in the Basin Plan as part of the Ballona Creek watershed, is actually in the Marina del Rey watershed. In order to be consistent with the Basin Plan, Ballona Lagoon is shown in this table, but recognize that it will be addressed in the Marina del Rey EWMP.

e: One or more rare species utilizes all ocean, bays, estuaries, and coastal wetlands for foraging and/or nesting.

f: Aquatic organisms utilize all bays, estuaries, lagoons, and coastal wetlands, to a certain extent, for spawning and early development. This may include migration into areas which are heavily influenced by freshwater inputs.

s: Access prohibited by Los Angeles County Department of Public Works.

w: These areas are engineered channels. All references to Tidal Prisms in Regional Board documents are functionally equivalent to estuaries

* Asterisked MUN designations are designated under SB 88-63 and RB 89-03. Some designations may be considered for exemption at a later date (See pages 2-3, 4 for more details).

au: The REC-1 use designation does not apply to recreational activities associated with the swimmable goal as expressed in the Federal Clean Water Act section 101(a)(2) and regulated under the REC-1 use in the Basin Plan, or the associated bacteriological objectives set to protect those activities. However, water quality objectives set to protect other REC-1 uses associated with the fishable goal as expressed in the Federal Clean Water Act section 1010(a)(2) shall remain in effect for waters where the (au) footnote appears.

av: The High Flow Suspension only applies to water contact recreational activities associated with the swimmable goal as expressed in the federal Clean Water Act section 101(a)(2) and regulated under the REC-1 use, noncontact water recreation involving incidental water contact regulated under the REC-2 use, and the associated bacteriological objectives set to protect those activities. Water quality objectives set to protect [1] other recreational uses associated with the fishable goal as expressed in the federal Clean Water Act section 101(a)(2) and regulated under the REC-1 use and [2] other REC-2 uses (e.g., uses involving the aesthetic aspects of water) shall remain in effect at all times for waters where the (av) footnote appears.

3 Regulatory Framework

3.1 MS4 Permit

On November 8, 2012, the Regional Board adopted Waste Discharge Requirements (WDRs) for MS4 discharges within the Coastal Watersheds of Los Angeles County, except those discharges originating from the City of Long Beach which are covered under a different MS4 permit (Order No. R4-2012-0175; NPDES Permit No. CAS004001). The MS4 Permit, which became effective on December 28, 2012, applies to the LACFCD, County of Los Angeles and 84 incorporated cities within Los Angeles County, including the cities within the Ballona Creek watershed. The 2012 MS4 Permit supersedes the MS4 Permit previously adopted in 2001. The MS4 Permit contains WQBELs, RWLs, additional TMDL provisions, and outlines the process for developing the Ballona Creek Enhanced Watershed Management Program (EWMP), which is currently under development.

3.2 Applicable TMDLs and Implementation Schedules

While the focus of the analysis contained within this report is on the potential effect of alternative approaches to address the Bacteria TMDL, there are a number of TMDLs for the watershed. Section 303(d) of the Clean Water Act requires states to prepare a list of water bodies that do not meet water quality standards and establish TMDLs to ensure attainment of water quality standards. **Table 3** presents TMDLs developed for the Ballona Creek watershed and TMDLs that apply to the Ballona Creek watershed as a subwatershed of the Santa Monica Bay. **Table 4** presents interim and final compliance deadlines for the relevant TMDLs. **Table 4** does not include the Santa Monica Bay Beaches Bacteria TMDLs because the WLAs for these TMDLs for the receiving waters in the Ballona Creek watershed are established in the Ballona Creek, Ballona Estuary, and Sepulveda Channel Bacteria TMDL.

Table 3. TMDLs Applicable to the Ballona Creek Watershed

TMDL	Regional Board Resolution Number(s)	Effective Date and/or EPA Approval Date
Ballona Creek Trash (BC Trash)	2004-023	08/11/2005
Ballona Creek Estuary Toxic Pollutants (BC Toxics TMDL)	2005-008	01/11/2006
	2013-010	10/26/2015
Ballona Creek, Ballona Estuary, and Sepulveda Channel Bacteria (BC Bacteria TMDL)	2006-011	04/27/2007
	2012-008	07/02/2014
Ballona Creek Metals (BC Metals TMDL)	2007-015	10/29/2008
	2013-010	10/26/2015
Santa Monica Bay Nearshore and Offshore Debris (Santa Monica Bay [SMB] Trash TMDL)	2010-010	03/20/2012
Santa Monica Bay DDTs and PCBs (SMB Toxics)	NA (USEPA TMDL)	03/26/2012
Ballona Creek Wetlands TMDL for Sediment and Invasive Exotic Vegetation (Wetlands TMDL)		03/26/2012

Table 4. Interim and Final TMDL Compliance Milestones Applicable to the Ballona Creek Watershed

TMDL	Water-bodies	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestones (Bolded numbers indicated milestone deadlines within the current Permit term) ¹											
					2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2025	
BC Trash	All Water-bodies	Trash	% Reduction	All	9/30 80%	9/30 90%	9/30 96.7%	9/30 100%								
Santa Monica Bay Trash	Santa Monica Bay	Trash	% Reduction	All					3/20 20%	3/20 40%	3/20 60%	3/20 80%	3/20 100%			
BC Toxics	Estuary	Sediment: Copper, Lead, Zinc, Silver, DDT, Chlordane, PCBs	% of MS4 Area Meets WQBELs	All		1/11		1/11		1/11					1/11	
					25%		50%		75%				100%			
Amended BC Toxics	Estuary	Sediment: Copper, Lead, Zinc, Silver, DDT, Chlordane	% of MS4 Area Meets WQBELs or Reduction in Loading	All		1/11			1/11	1/11					1/11	1/11
					25%			50%	75%				100%			
		Sediment: PCBs			25%			25%					50%	100%		
BC Metals	Reach 1, 2, Sepulveda Canyon	Copper, Lead, Zinc, Selenium	% of MS4 Area Meets WQBELs	Dry	1/11 50%		1/11 75%		1/11 100%						1/11	
				Wet	25%			50%					100%			
Amended BC Metals	Reach 1, 2, Sepulveda Canyon	Copper, Lead, Zinc	% of MS4 Area Meets WQBELs or Reduction in Loading	Dry	1/11 50%		1/11 75%		1/11 100%						1/11	
				Wet	25%			50%					100%			
BC Bacteria	Estuary	Total Coliform, Fecal Coliform, Enterococcus	Meet RWLs/WLAs	Dry		4/27 100%									7/15	
	Reach 1, 2, Sepulveda Channel, Centinela Creek, Benedict Canyon ²	<i>Escherichia coli (e. coli)</i>		Wet												100%

Table 4. Interim and Final TMDL Compliance Milestones Applicable to the Ballona Creek Watershed

TMDL	Water-bodies	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestones (Bolded numbers indicated milestone deadlines within the current Permit term) ¹										
					2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2025
Santa Monica Bay DDTs and PCBs	Santa Monica Bay	PCBs and DDT	Meet WLAs	All	USEPA TMDLs, which do not contain interim milestones or implementation schedule. The Permit (Part VI.E.3.c, pg. 145) allows MS4 Permittees to propose a schedule in an EWMP.										
BC Wetlands Sediment and Invasive Exotic Vegetation	Wetlands	Sediment and Invasive Species	Meet WLAs	All											

¹ The Permit term is assumed to be five years from the Permit effective date or December 27, 2017.

² Note that although Benedict Canyon Channel is identified in TMDLs as a tributary to Ballona Creek, it is a closed channel that daylights where the channel meets Ballona Creek and is not identified in the Basin Plan as a waterbody in the watershed. As such, it is not considered a tributary for the purposes other than addressing the bacteria TMDL for the watershed.

3.3 Time Schedule Order

To address potential MS4 Permit compliance issues related to the dry weather requirements of the Bacteria TMDL, the MS4 Permittees requested and were granted a Time Schedule Order (TSO) by the Regional Board. The TSO, effective from May 14, 2015 to December 15, 2019, identifies specific actions that must be completed to comply with the TSO. The actions listed in the TSO, include the MS4 Permittees' strategy to comply with the dry weather TMDL requirements that is primarily based on completing three regional projects that cover approximately 90% of the watershed:

- Low Flow Treatment Facility 1 located in Ballona Creek Reach 2
- Low Flow Treatment Facility 2 located in Sepulveda Channel
- Mesmer Low Flow Diversion located in Centinela Creek

The LA Sanitation is evaluating three potential approaches to utilize LFTF-1 to comply with the dry weather bacteria TMDL requirements as identified in the TSO. The three potential approaches for LFTF-1 are: (1) to treat instream flows and release treated water back to the receiving waters, (2) divert instream flows to the HWRP for treatment and beneficial reuse to offset potable water demand, and (3) a hybrid approach of treat-and-release and diversion to HWRP. These approaches have different effects on water quality. The treat-and-release approach returns water back to Ballona Creek which improves downstream water quality, while the diversion approach reduces Ballona Creek flow rates. All three approaches require regulatory processes and approval from various agencies, including the Regional Board.

The TSO required a series of actions to be completed over the course of the TSO schedule. Several of those actions focused specifically on LFTF-1 and the selection of a specific approach. The required actions identified in the TSO related to LFTF-1 include:

- July 13, 2015: Submit a Pollution Prevention Plan to the Regional Board that identifies tasks and schedules for attaining compliance by December 15, 2019, inclusive of the LFTF-1.
- May 16, 2016: Submit an evaluation of the alternative to construct a diversion to the sanitary sewer system or downstream of the proposed LFTF-1 site.
- July 13, 2016: Indicate whether the responsible Permittees will complete LFTF-1 or complete the diversion to sanitary sewer alternative.
- September 30, 2019: Complete work related to the LFTF-1 (i.e., treat and release or diversion to Hyperion).
- December 15, 2019: Attain dry weather RWLs and WQBELs.

To support next steps related to selecting an alternative for LFTF-1, this report presents an assessment of the potential effect of the options on flow and water quality, biological resources, and the regulatory requirements.

4 Flow and Water Quality Assessment

The motivation for implementing the LFTF-1 project are requirements to achieve the dry weather WQOs for Ballona Creek based on requirements (i.e., TMDL targets and waste load allocations) of the Ballona Creek Bacteria TMDL that have been incorporated into the MS4 Permit. At the same time, the LFTF-1 facility could be used to augment potable water supplies by diverting a portion of Ballona Creek flows to HWRP for treatment. These two goals have different effects on water quality – the treat-and-release approach returns water back to Ballona Creek that improves downstream water quality during dry weather, while the diversion approach reduces Ballona Creek flow rates. In order to evaluate the potential effect of treat-and-release versus diversion, and to consider options for hybrid approaches, a water quality model was applied to predict water quality outcomes downstream of LFTF-1 in Ballona Creek Reach 2.

To analyze the potential effectiveness of LFTF-1 and LFTF-2, the QUAL2K modeling system was used. The QUAL2K model is steady-state based on a defined set of boundary conditions, which in this case were based on measured flows and concentrations during previous monitoring programs. QUAL2K is a river and stream water quality model that simulates one-dimensional flow with the assumption of a well-mixed channel both vertically and laterally. The underlying numerical model was originally developed in the late 1980s as QUAL2E. The model was updated in the 2008 as QUAL2K with a modern user interface, increased resolution for model segmentation, and the ability to model pathogens (including the effects of temperature, light, and settling). QUAL2K is currently supported by the USEPA and has been widely applied throughout the United States for various TMDL studies.

4.1 Modeling Approach

The QUAL2K model was initially configured as documented in the Ballona Creek EWMP (BCWMP, 2015a [see Appendix 6.B1]), which used the QUAL2K model for the dry weather reasonable assurance analysis (RAA). The initial QUAL2K modeling effort, as described in the EWMP, began with a baseline representation of Ballona Creek Reaches 1 and 2 during dry weather, and evaluated the effect of LFTF-1 and LFTF-2 under a treat-and-release scenario during typical/median conditions. Key direct inputs and assumptions used in the QUAL2K model include:

- Stream velocities measured during the 2006 Ballona Creek flux study (Noble et al., 2006);
- A first order *E. coli* decay rate of 0.09/hour developed for the LA River Bacteria TMDL (Regional Board, 2010);
- *E. coli* concentration in effluent of LFTF-1 and LFTF-2 was assumed to be 50 MPN per 100mL under options where effluent was treated and released;
- Diffuse inputs representing non-point source inputs from storm drains as measured during the 2012 Ballona Creek storm drain reconnaissance study. The TMDL Outfall Monitoring Plan for the Ballona Creek Bacteria TMDL, submitted to the Regional Board in April 2013, includes a description of the reconnaissance study and its results (Monitoring Plan Sub-Committee, 2013).

As described below, to support evaluation of additional alternatives for LFTF-1 and LFTF-2 – including 100% diversion, 100% treatment and “hybrid” options – the QUAL2K model was applied under multiple critical conditions scenarios and varying treatment rates.

4.2 Data Reviewed for Critical Condition Analysis

In order to consider critical conditions, two primary types of data were reviewed: [1] dry weather flow rates in Ballona Creek and [2] loading from inputs downstream of LFTF-1. The following subsections describe the data reviewed and findings used to support the QUAL2K modeling.

4.2.1 Ballona Creek Dry Weather Flow Rates

For the dry weather critical condition analysis, as shown in **Figure 3**, the 90th percentile dry weather flow rate was calculated using data between October 1987 and September 2012, by removing days with greater than 0.1 inches of rainfall and the following three days from the flow record. The orange line in **Figure 3** shows the flow duration curve for the dry weather days, and the 90th percentile flow rate is approximately 45 cfs. Based on this screening-level analysis, for the diversion structure for LFTF-1, a diversion rate of 45 cfs would divert 100% of the dry weather flow from Ballona Creek on 90% of dry days.

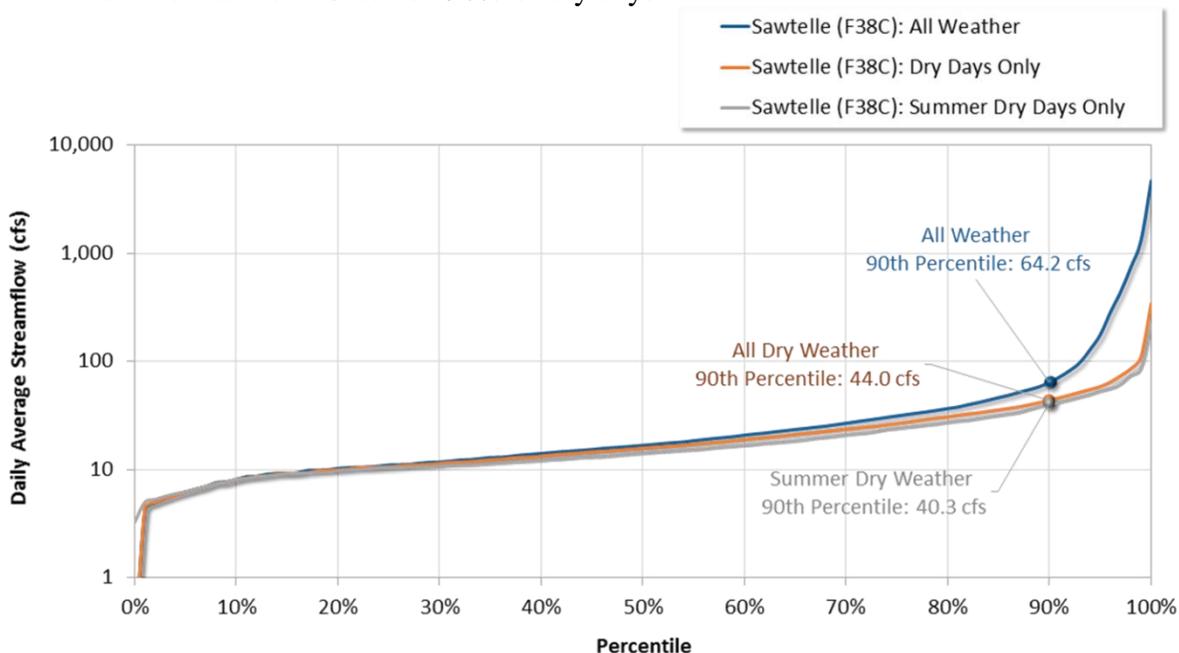


Figure 3. Flow Duration Curve for Ballona Creek at Sawtelle Avenue (near LFTF-1).

4.2.2 Downstream Storm Drains and Sepulveda Channel

When evaluating critical conditions for performance of LFTF-1, the primary variable to consider is the loading of *E. coli* downstream of LFTF-1. The treated effluent from LFTF-1 provides dilution / assimilative capacity of downstream inputs. The higher the *E. coli* loading from downstream inputs, the more treated effluent from LFTF-1 is needed to achieve RWLs in Ballona Creek Reach 2.

Relatively little flow or concentration data are available for Sepulveda Channel and the storm drains downstream of LFTF-1. Available flow data for the downstream storm drains and Sepulveda Channel¹ are the following:

- **Summer 2012 Recon:** one monitoring event that measured *E. coli* and flow rates from each storm drain and Sepulveda Channel.
- **Summer 2015 Non-Stormwater Screening:** two monitoring events that measured flow rates and *E. coli* concentrations from each storm drain. Flow from Sepulveda Channel was not measured.

As such, unlike in Ballona Creek receiving water stations where long-term flow and water quality datasets are available, the critical condition for Sepulveda Channel and downstream storm drains must be extrapolated from a few monitoring data points. Approximately six (6) storm drains tend to be flowing during dry weather downstream of LFTF-1 in the non-tidal portion of Ballona Creek (upstream of Centinela Blvd bridge). Previous modeling with QUAL2K (as described in the Ballona Creek EWMP [BCWVG, 2015a]) was based on the single event from the Summer 2012 Recon, meaning that a single event was used to estimate the typical / expected flow rates from Sepulveda Channel and typical flow and loading from downstream storm drains.

For the critical conditions analysis, the more recent data from the Summer 2015 Non-Stormwater Screening were reviewed and the measured storm drain loading rates downstream of LFTF-1 were compared to those measured during the Summer 2012 Recon. Both the storm drain flow rates and *E. coli* loading downstream of LFTF-1 measured during the Summer 2015 Non-stormwater Screening were lower than measured during the Summer 2012 Recon. The downstream storm drain *E. coli* loading measured during the two Summer 2015 Non-Stormwater Screening events was about one-fourth of the loading measured during the single event of the Summer 2012 Recon. The lower flow and loading conditions in 2015 are likely a reflection of the worsened drought conditions – the Summer 2012 Recon may have represented more typical baseflow conditions in the watershed that could be expected if/when the drought ends.

For the critical conditions analysis, the conditions during the Summer 2012 Recon are used as the baseline and multipliers on the flow rates are used to represent potential critical conditions that may occur in the future, as described in the next section.

4.3 Results

Using the QUAL2K model described in the previous section, the portion of the Ballona Creek downstream of LFTF-1 was simulated under several scenarios to evaluate critical dry weather conditions. These scenarios are presented in **Table 5**. The scenarios were designed to identify the resiliency of different LFTF-1 treatment rates for attaining downstream RWLs. The simulated conditions were as follows:

- Diversion rate of 45 cfs (29 million gallons per day, MGD) was assumed at LFTF-1, which as described above would address 100% of the dry weather flow on 90% of dry weather days.

¹ For Sepulveda Channel, the concentration of *E. coli* in the QUAL2K modeling is based on the Ballona Creek Coordinated Monitoring Plan (CMP) data, which has collected samples approximately weekly since 2008.

- Incremental LFTF-1 treatment rates of 3 MGD, 6 MGD, 9 MGD, 12 MGD and 15 MGD were simulated. These are the unit treatment rates based on the available pre-packaged 3 MGD ultraviolet (UV) treatment reactors.
- Treatment rate at LFTF-2 was simulated as 2 cfs (1.3 MGD). If the flow rate in Sepulveda Channel is above 2 cfs, then the excess flow would be bypassed / untreated. The selected treatment rate of 2 cfs for LFTF-2 is considered conservative because it is well above the flow rate of 1.59 cfs measured during the Summer 2012 Recon. All flow diverted to LFTF-2 is assumed to be disinfected to 50 MPN per 100mL (*E. coli*), and returned to Sepulveda Channel.
- Effluent concentrations of *E. coli* from LFTF-1 and LFTF-2 were conservatively assumed to be 50 MPN per 100mL; although UV treated effluent would be expected to have lower concentrations.

As shown in **Figure 4**, for each LFTF-1 treatment rate (3, 6, 9 and 15 MGD), QUAL2K was used to determine the maximum percent increase in baseline downstream flows/loads that could occur while the geometric mean RWL is still attained. The increases in downstream flows above the baseline, also shown in **Table 5**, represent the potential safety factors when specifying the LFTF-1 treatment rate. Under the baseline critical condition (as measured during the June 2012 Recon), a treatment rate of 3 MGD would likely attain the downstream RWLs in Ballona Creek even if downstream flows / loads increased by 36% (1.36X). If flows/loads increased by up to 54% (1.54X), then 6 MGD of treatment is needed. With 15 MGD of treatment, a doubling (2X) of downstream flows / loads could occur and the RWLs would likely still be attained. If flows / loads more than doubled beyond baseline, then more than 15 MGD of treatment would likely be needed to achieve RWLs.

Table 5. QUAL2K Scenarios for Critical Condition Analysis and Simulated Concentrations

Scenario	Assigned Boundary Conditions ¹					Simulated <i>E. coli</i> Concentration at Outlet of Ballona Creek Reach 2 (MPN/100mL)
	Diversion Rate at LFTF-1 (MGD)	Treatment Effluent Discharged from LFTF-1 (MGD)	Diversion to Hyperion Treatment Plant from LFTF-1 (MGD)	Diversion Rate and Treated Effluent from LFTF-2 (MGD)	Factor of Safety for attaining RWLs in downstream Reaches	
A	29	0	29	1.3	0	203
B	29	3	26	1.3	1.00	95
C	29	3	26	1.3	1.36	126
D	29	6	23	1.3	1.54	126
E	29	9	20	1.3	1.71	126
F	29	15	14	1.3	2.00	119

1 – Effluent from LFTF-1 and LFTF-2 was assumed to have *E. coli* concentration of 50 MPN per 100mL.

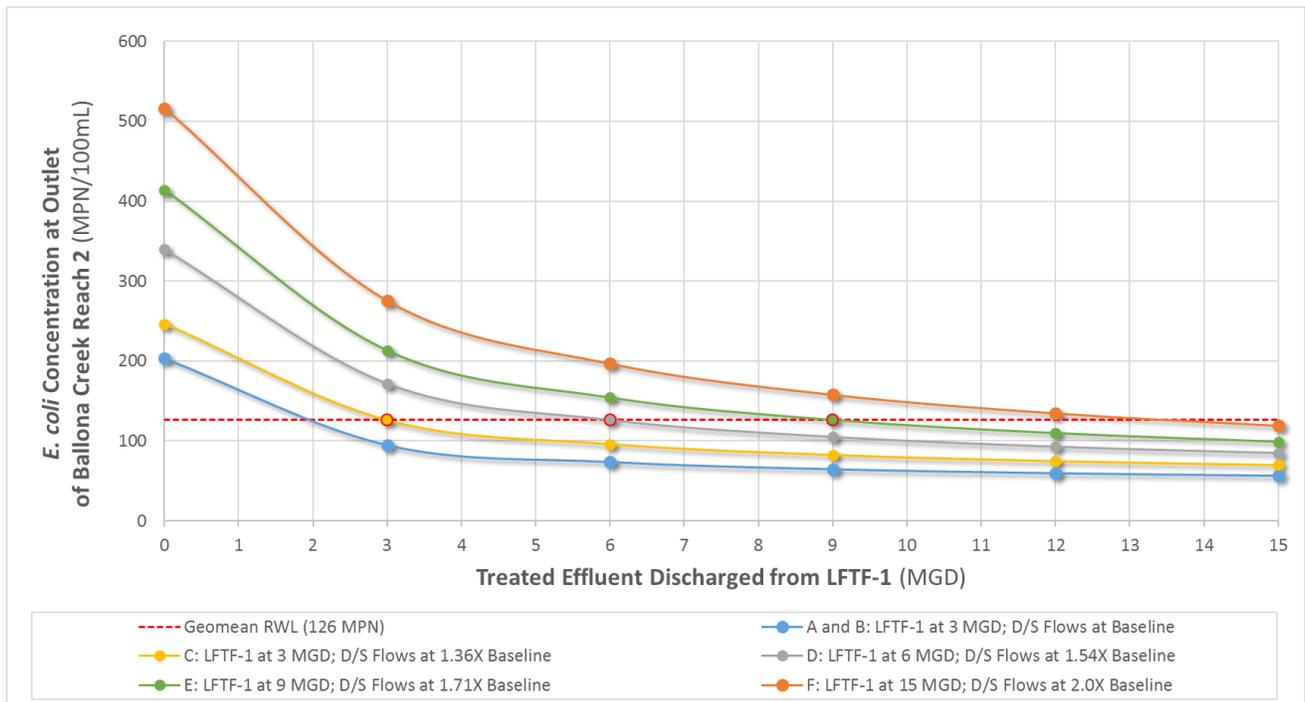


Figure 4. Results of Critical Conditions Analysis: *E. coli* Concentrations at Outlet of Ballona Creek Reach 2 with Increased Downstream Flows under Different LFTF-1 Treatment Rates

4.4 Summary of Flow and Water Quality Assessment

The critical condition analysis will support selection of treatment alternatives for LFTF-1. The selected treatment rate for LFTF-1 is ultimately a balance between the desired certainty that WQOs will be attained at the outlet of Ballona Creek Reach 2 and the desire to utilize flows for potential reuse at HWRP. With 3 MGD of treatment at LFTF-1, WQOs could be attained under baseline critical conditions and 6 MGD of treatment could support attainment even if assumed baseline loading downstream of LFTF-1 increased by 54%. Important future considerations include the following:

- The ongoing non-stormwater screening and source investigations along Ballona Creek under the CIMP will complement the reductions achieved by LFTF-1 and LFTF-2. Water conservation and source reduction programs will increase the reliability of attaining the WQOs.
- The estimate of flow rates and *E. coli* loading from downstream storm drains is based on very limited data. As more data are collected under the CIMP, the assumed critical conditions baseline could be re-evaluated / updated.
- The analysis of 90th percentile dry weather flow conditions in Ballona Creek (Section 4.2.1) identified a potential diversion rate of 29 MGD (45 cfs). For example, with 3 MGD of treatment capacity, 26 MGD of Ballona Creek flows would be diverted to HWRP during the 90th percentile dry weather flow. If HWRP cannot accept 26 MGD of flow, then more than 3 MGD of treatment capacity may be needed at LFTF-1.
- Downstream water quality is sensitive to the concentration of *E. coli* in the discharged effluent. The assumed concentration of treated effluent from LFTF-1 and LFTF-2, 50 MPN per 100mL, is on the order of the RWL of 126 MPN per 100mL. The relatively small difference between 50 and 126 MPN per 100mL limits the beneficial impact of dilution that can be provided by effluent from LFTF-1. If the discharged effluent could achieve a lower concentration (e.g., 2 MPN per 100mL), then the likelihood of RWL attainment would be increased.
- LA Sanitation may consider operating LFTF-1 in a hybrid mode that is dynamic and based on flows from downstream inputs. For example, real-time in situ sensors could be placed in Sepulveda Channel and downstream storm drains and the LFTF-1 treatment rate could be selected based on the measured flows from those inputs. For example, the baseline treatment rate of LFTF-1 could be 3 MGD, but if flows from downstream inputs exceed a certain threshold then an additional 3 MGD of effluent (for a total of 6 MGD) could be treated and released.

5 Biological Assessment

The biological assessment utilized available information to identify habitats in the water bodies within the Ballona Creek watershed that could potentially be affected as a result of partial or the 100% diversion. Following identification of these habitats, the species composition in these areas were identified based on available data, and species of concern, and rare and sensitive species were identified; life history of these species, including special habitat needs, were summarized. Based on current and predicted freshwater flow following project implementation, the potential for impacts to habitats and species of concern in the project area as a result of the options were reviewed. A summary of the information is provided in the following subsections.

5.1 Ballona Creek and Estuary

Ballona Creek Reaches 1 and 2 are channelized with concrete walls and no vegetation; they have no viable habitat for the species of concern. The Estuary portion of the creek is lined by sloped banks composed of concrete or riprap and concrete with a soft bottom creek bed. In the upper Estuary in areas where there is riprap at the base of the sloped banks, sediment has accumulated and the creek edges are vegetated by shrubs and palms along the waterline. Further downstream near the mouth of the Ballona Creek Estuary, the riprap bank supports only sparse growth of some salt tolerant plant species along the waterline, with occasional occurrences of shrubs on the creek bank above the riprap. The estuary experiences tides reaching as far as the Lincoln Boulevard Bridge (Greeninfo Network 2008). Wetlands, bays and estuaries in southern California serve as nursery areas for several fish species, including California halibut (*Paralichthys californicus*) (Cross and Allen 1993). Juveniles of non-commercial species and small fish species such as gobies (*Gobiidae*) and topsmelt (*Atherinops affinis*) dominate bay and estuarine assemblages, serving as forage for economically important fish and bird species. A baseline study of the Ballona Creek Estuary conducted by the Santa Monica Bay Restoration Committee (SMBRC) determined the habitat in the Ballona Creek Estuary was suitable for a number of estuary and marine fish species. However, the results of a fish population study were inconsistent, leading the investigators to question if their sampling methods were adequate to characterize the fish population or if fish were not utilizing this estuarine habitat (Johnston et al. 2015). Some sensitive species, such as California least terns, may occasionally roost on exposed flats at the mouth of the creek or forage for small fish in the estuary.

5.2 Del Rey Lagoon

Del Rey Lagoon is a small coastal saline pond separated from the Ballona Creek Estuary by a 40-ft wide levee. Periodic water exchange in the Del Rey Lagoon is accomplished through a manually controlled tide gate at the north end of the lagoon connected to the tidally influenced portion of Ballona Creek. Additional exchange occurs on some high tides, when tidal elevation exceeds the invert level of the tide gate (Josselyn et al. No date). Del Rey Lagoon is surrounded by an urban park with highly manicured landscaping, lawns, a sandy beach, a picnic area, and playing fields along the southern end of the lagoon on level parkland about 10 ft above the elevation of the lagoon (WRA 1990). The banks along the southern end of Del Rey Lagoon are landscaped and maintained as an urban park. Landscaping includes invasive and ornamental plantings such as lawns, palm and various shade trees, large bushes and pampas grass, and iceplant ground cover. On the northern end of the lagoon, the area is dominated by iceplant and weedy species along the banks.

Del Rey Lagoon appears to be particularly attractive to waterfowl, which comprise the most commonly observed group of water-associated birds in the lagoon. Mallard (*Anas platyrhynchos*), lesser scaup (*Aythya affinis*), American widgeon (*Anas penelope*), bufflehead (*Bucephala albeola*), brant (*Branta bernicla*) and domesticated ducks and geese have been observed consistently in the area, although some are found only in winter (SMBAS 1999, 2001; Audubon California 2005). Less commonly observed waterfowl include Canada goose (*Branta canadensis*), Ross's goose (*Chen rossii*) and white-fronted goose (*Anser albifrons*). Wading birds, including herons and egrets, are regularly observed foraging in the area in the early mornings (WRA 1990), and a least bittern (*Ixobrychus excilis*) was observed in the area in June 2005 (L.A. Times 2005). Other water-associated bird species, including American coot (*Fulica*

americana), gulls and terns are also likely to be observed utilizing the area. The fish assemblage of Del Rey Lagoon is expected to be similar to that found in Ballona Creek Estuary. The fish community is likely to be dominated by topmelt, gobies and other small fish species, with lesser numbers of demersal predator fish species such as turbot and California halibut.

5.3 Ballona Wetland Ecological Reserve

Ballona Wetlands Areas A and C have varying amounts of upland and riparian scrub, upland grassland and dune, and seasonal wetland habitats (GreenInfo Network. 2008). In addition, a small amount of upland forest habitat is found in Area A. Neither Area A nor Area C receives flow from the Ballona Creek system nor are they subject to tidal influence. Water input in these areas is restricted to seasonal rain water and the size and duration of the wetlands in these areas depends on the amount of rain they receive yearly. Sediments are saturated with salt, so the seasonal pools in Areas A and C are saline (Johnston et al. 2012).

Wetland Area B is characterized by seasonal wetlands, brackish marsh, upland and riparian scrub, and grassland and dune habitat in the eastern half of the area (GreenInfo Network. 2008). The seasonal wetlands of Ballona Wetland Area B are at a higher elevation and are not influenced by tidal exchange. These wetlands get their water from winter rainfall and mix with salty soils to create saline conditions, similar to wetlands found in Areas A and C (Johnston et al 2015). The western half of Area B is tidally influenced and includes tidal channels, low, mid and high estuarine marsh, salt pan, riparian forest and freshwater wetland, in addition to small areas of the upland habitats noted for the other areas.

The tidally influenced portion of Wetland Area B supports marine species and species that are extremely salt-tolerant. The area of tidal influence in Wetland Area B is about six acres, a relatively small area, which limits the estuarine marsh habitat in the area. This estuarine habitat is characterized by narrow tidal channels (Johnston et al. 2012, Friends of Ballona Wetlands 2015) with vegetated intertidal banks that supports a estuarine marsh that includes common salt tolerant plant species including pickleweed, salt grass (*Distichlis spicata*) and Parish's pickleweed (*Arthrocnemum subterminale*). At higher elevations within the tidal influence are salt pans, which are inundated on the highest tides, but retain water between high-tide periods, generally becoming shallower and more saline as the water in the pans evaporate. These salt pans are also filled by rain water, but because the soils in the salt pans have accumulated high levels of salt from tidal flooding, saline conditions develop when the pools are filled (Johnston et al. 2012).

The tidal channels of Wetland Area B likely support salt marsh fish species like California killifish (*Fundulus parvipinnis*), topmelt (*Atherinops affinis*) and slough anchovy (*Anchoa delicatissima*). However, the limited tidal inundation likely reduces nursery functions compared to a fully tidal system estuary system (Johnston et al 2015). Use of the area by plunge-feeding birds such as California least tern is likely limited due to the limited area of open channel in the area, although foraging use by wading birds such as great blue herons would be expected.

5.4 Freshwater Wetland System

The Freshwater Wetland System includes two habitats (Riparian Corridor and Ballona Freshwater Marsh) that are hydrologically linked together and to Centinela Creek. The Riparian

Corridor receives at least one cfs of treated ground water supply. The general description of a riparian habitat is “defined by a freshwater stream of presence or fresh ground water within reach of plant roots.” Most of the riparian habitat consists of willows, and studies have shown that diversity in Ballona Creek region has increased since the completion of this area (NCWP No date, Friends of Ballona Wetlands 2015).

The Fresh Water Marsh covers twenty-six acres and runs along the southern side of Jefferson Boulevard and western side of Lincoln Boulevard. It shares a border with the eastern side of Ballona Wetland Area B (Friends of Ballona Wetlands 2015). This area attracts more than 200 species of birds, one of the largest varieties of any coastal marsh area, and many of which haven’t been seen in Ballona in decades. When the freshwater marsh was constructed it was given established goals by federal, state and local permits. In the twelve years that it has been functioning, the system has exceeded both its five-and ten-year goals. The marsh has accomplished its goal of an increase in biodiversity by providing a freshwater ecosystem (NCWP No Date, Friends of Ballona Wetlands 2015).

5.5 Ballona Species of Interest

A review was made of existing information to identify sensitive species and habitats known to occur (or that formerly occurred) in the Ballona Creek watershed, and evaluate potential impacts on those species and habitats as a result of partial or 100% diversion of treated water in Ballona Creek. Criteria used for inclusion was: Federal or California listing as a threatened or endangered species, a California species of concern, or California Natural Diversity Database (CNDDDB)

Ranking of S1 (State Ranking is a reflection of the overall condition of a species within California: S1 = Less than 6 element occurrences, or less than 1,000 individuals, or less than 2,000 acres). Seventeen species meeting these criteria were identified: one plant, two butterflies, a lizard, ten birds and three mammals. Data sources and occurrence information regarding these species are presented in **Appendix 1**. This information is summarized below in **Table 6**. Included for each is an impact determination for the species for the 100% diversion and hybrid options. Note that under a 100% treat and release option flows would not be affected.

Impacts were based on a scale of high, moderate, or low. High impact would be assigned to species with a high likelihood of reduction to the local population as a result of direct mortality or loss of essential habitat. Moderate impact would include those species that would be likely to leave the area due to the change in local conditions or a reduction in essential habitat. The low impact determination was used for all remaining species, those that would not be impacted directly or indirectly by the potential flow reductions, or those that are known to occur locally in areas or habitats that will not be affected by the project.

Four additional sensitive species have been noted in **Appendix 1**, but are not included in **Table 6**. Suitable habitat for California Black Rail (*Laterallus jamaicensis coturniculus*) and California Gnatcatcher (*Polioptila californica californica*) exist in the project area, but they have not been reported. Two species, Pacific Pocket Mouse (*Perognathus longimembris pacific*) and Riverside Fairy Shrimp (*Streptocephalus woottoni*), are considered extirpated from the area.

Table 6. Sensitive species know to occur in the project area

Species Name	Protection Designation	Habitat and Occurrence	Comment	Likelihood of Impact from Freshwater Flow Reduction
Orcutt's Yellow Pincushion <i>Chaenactis glabriuscula var. orcuttiana</i>	S1(see above)	Requires sandy soils. Seen in Wetland Area B.	Coastal bluff scrub and coastal dune species, does not depend on freshwater flow.	Low
El Segundo Blue Butterfly <i>Euphilotes battoides allyni</i>	Federally Endangered	Dependent on occurrence of buckwheat <i>Eriogonum parvifolium</i> . This plant was found in seasonal brackish and freshwater wetlands and also in upland scrub, dune and grassland habitat types	Recovery Unit for this species covers the portions of Ballona west of Hwy-1 to the ocean (Figure 2). Recent effort has had success in bringing this species of buckwheat back to the Ballona Creek area. Drought-tolerant to moderate water use, does not require freshwater flow.	Low
Monarch Butterfly <i>Danaus plexippus</i>	State Species of Special Concern	Require Milkweeds. Seen in the Salt Marsh and Wetland Area B.	No data to support milkweeds are found in Ballona	Low
California Legless Lizard <i>Anniella pulchra</i>	State Species of Special Concern	Require areas where substrates are slightly moist. Seen in the Dunes of Wetland Area B	Needs some moisture to shed, but the species is typically found in coastal dunes suggesting, it does not have to be freshwater. Locally found in dunes adjacent to tidal marsh. Reduction in freshwater into the system is not expected to change habitat	Low
Least Bell's Vireo <i>Vireo bellii pusillus</i>	State and Federally Endangered	Nest in Willows and other shrub/tree species. Found in the Freshwater Marsh and Riparian Corridor	Freshwater Marsh and Riparian Habitat are supported by flow from Centinela Creek which will not reduce freshwater flow as part of this project.	Low
Belding's Savannah Sparrow <i>Passerculus sandwichensis beldingi</i>	State Endangered	Nests in <i>Salicornia pacifica</i> also uses saltgrass and Parish's pickleweed. Seen in Wetland Area B/Saltmarsh	Host plant a salt marsh species. Will not be impacted by the reduction of freshwater in the Ballona Creek system.	Low
California Least Tern <i>Sternula antillarum browni</i>	State and Federally Endangered	Require areas of little vegetation around estuaries/ lagoons to make their nests. Seen foraging in the Freshwater Marsh, the Riparian Corridor, Estuary and Del Rey Lagoon	Nearshore and estuarine forage fish will not be impacted by flow reduction. Freshwater Marsh and Riparian Habitat are supported by flow from Centinela Creek which will not reduce freshwater flow as part of this project.	Low
Burrowing Owl <i>Athene cunicularia</i>	State Species of Special Concern	Require burrowing-mammal-made homes and open, dry, treeless areas. Seen in the channel levees of Del Rey Lagoon	Habitat preference not dependent on local freshwater flow.	Low
Least Bittern <i>Ixobrychus exilis</i>	State Species of Special Concern	Require freshwater or brackish marsh with tall vegetation. Seen in the Freshwater Marsh and Riparian Corridor	Freshwater Marsh and Riparian Habitat are supported by flow from groundwater and wet weather runoff which will not reduce freshwater flow as part of this project.	Low

Species Name	Protection Designation	Habitat and Occurrence	Comment	Likelihood of Impact from Freshwater Flow Reduction
Loggerhead Shrike <i>Lanius ludovicianus</i>	State Species of Special Concern	Require open areas with minimal short vegetation. Seen in the salt marsh	Local preferred habitat is the salt marsh, which will not be impacted by the reduction of freshwater in the Ballona Creek system.	Low
Tricolored blackbird <i>Agelaius tricolor</i>	State Endangered State Species of Special Concern	Require flooded or dense areas that are easily defensible for nesting. Seen in the Freshwater Marsh and the Riparian Corridor	Freshwater Marsh and Riparian Habitat are supported by flow from Centinela Creek which will not reduce freshwater flow as part of this project. (Note that species was given 6 month emergency State Endangered Status in December 2014).	Low
Yellow warbler <i>Dendroica petechia</i> ssp. <i>brewsteri</i>	State Species of Special Concern	Require stream-side thickets Seen in the Freshwater Marsh and Dune Willows of Wetland Area B	Freshwater Marsh and Riparian Habitat are supported by flow from Centinela Creek which will not reduce freshwater flow as part of this project.	Low
Light-footed clapper rail <i>Rallus longirostris levipes</i>	State and Federally Endangered	Nests in cordgrass in high marsh within the low marsh	Nesting does not occur in the Ballona Wetland Region. Only two records of observations since the 1950s.	Low
Vesper Sparrow <i>Poocetes gramineus</i>	State Species of Special Concern	Require dry open or weedy fields. Seen in the Freshwater Marsh and the Riparian Corridor	Freshwater Marsh and Riparian Habitat are supported by flow from Centinela Creek which will not reduce freshwater flow as part of this project.	Low
Western Snowy Plover <i>Charadrius alexandinus nivosus</i>	Federally Threatened	Require Sandy Beaches	Uses Ballona region in a migratory fashion	Low
South Coast Marsh Vole <i>Microtus californicus stephensi</i>	State Species of Special Concern	Require Salt Marsh. Seen in Wetland Area B	Salt marsh species. Will not be impacted by the reduction of freshwater in the Ballona Creek system.	Low
Southern California Salt Marsh Shrew <i>Sorex ornatus salicornicus</i>	State Species of Special Concern	Require Salt Marsh. Seen in Wetland Area B	Salt marsh species. Has not been reported since the 1980s. Will not be impacted by the reduction of freshwater in the Ballona Creek system.	Low
Salt Marsh Harvest Mouse <i>Reithrodontomys raviventris</i>	State and Federally Endangered	Require Salt Marsh and dense pickleweed.	Habitat exists, but the species has not been reported in the area	Low

5.6 Biological Assessment Summary

Based on the findings presented above, it appears that limiting the supply of freshwater through Ballona Creek would not negatively impact sensitive species known to occur in the area. There were no species in Ballona Creek Reaches 1 or 2 or sensitive species in the Ballona Creek Estuary that would be affected by either scenario. The habitats that make up the BWER receive their water from tidal inundation and storm water, neither of which would be affected by either flow reduction scenario. In summary, the potential options to treat and release, divert water, a hybrid integrating the two are not expected to affect any of the sensitive species known to occur in the Ballona Creek watershed.

6 Overview of Regulatory Requirements

There are different regulatory requirements associated with treat and release and diversion options (with a hybrid approach expected to have similar requirements as a 100% diversion options). As a general matter, it is understood that the waters of Ballona Creek are primarily, and at times exclusively, fed from the stormdrain system to which the cities of Los Angeles, Beverly Hills, Culver City, and West Hollywood discharge. Despite the fact that the cities collect runoff into their stormwater systems and temporarily exercise control over said flows, this does not automatically give the cities a water right to the flows in Ballona Creek. Rather, in order to divert and *use* the flows in Ballona Creek, as contemplated under options where flows are diverted to HWRP for reuse, the cities may have to obtain a water right permit from the California State Water Resources Control Board (State Board). If the City (acting as the lead agency and owner and operator of the project) merely diverts, treats and then returns 100% of the flows to Ballona Creek, the City probably does not need a water right (but may need a NPDES permit under Clean Water Act). Besides associated water rights or NPDES permitting issues, regulatory requirements related to state and federal listed endangered species, discharge and fill permits, stream bed alteration permits, and others may also be an issue. The process of gaining approval to meet the regulatory requirements can take a varying degree of time to complete and may affect the implementation schedule for LFTF-1. **Table 7** presents a summary of the potential agencies that have to permit or approve aspects of the various options. Note that it is assumed the City will act as the lead agency and is therefore referenced as the entity seeking permits/regulatory approval.

Table 7. Summary of Potential Reviewing Agencies Permits and Approvals Associated with Ballona Creek Treat and Release or Diversion Scenarios

Agency	Potential Permit/Approval	Project Component
State Water Resources Control Board	Water right permit for diversion of unappropriated water from Ballona Creek.	Intake pipe/facility
	Clean Water Act, section 401 water quality certification	Intake pipe/facility, and conveyance pipeline (possibly)
Los Angeles Regional Water Quality Control Board	NPDES Construction Storm Water Permit	Intake pipe/facility, and conveyance pipeline
	Waste Discharge Requirements Permit	Discharge of treated water back into Ballona Creek (unless demonstrated that treatment does not have the potential to add pollutants)
California Dept. of Fish & Wildlife	CA Endangered Species Act, sections 2080.1 and 2081	Intake pipe/facility, and conveyance pipeline
	California Fish and Game Code, Section 1602 Permit (Lake or Streambed Alteration Agreement)	Intake pipe/facility, and conveyance pipeline (possibly)
California Department of Transportation	Encroachment Permit	Conveyance pipeline (depends on route)
California Coastal Commission	Local Coastal Permit; Federal Consistency Determination ¹	Intake pipe/facility, and conveyance pipeline
U.S. Army Corps of Engineers	Clean Water Act, Section 404 Permit	Intake pipe/facility, and conveyance pipeline (possibly). This and other references to the conveyance pipeline “possibly” triggering a permit required are generally associated with a scenario where the pipeline is routed in a manner that impacts the bed/bank of the creek.
	River & Harbor Act, Section 10 Permit	Only if there is a determination that Ballona Creek is “navigable” ² waterway
	Lead Agency for NEPA environmental review	Whole project
NOAA Fisheries	Endangered Species Act, Section 7 consultation	Intake pipe/facility, and conveyance pipeline
U.S. Fish & Wildlife Service	Endangered Species Act, Section 7 consultation	Intake pipe/facility, and conveyance pipeline
City of Los Angeles	Lead agency for CEQA environmental review	Whole project
South Coast Air Quality Control District	Authority to Construct Permit	Any component that emits air pollution
LACFCD	Construction Permit Maintenance Agreement	Ballona Creek is maintained by LACFCD

1. These regulatory requirements only apply if the project is located within the designated local coastal zone. If the LFTF proceeds, there will need to be coordination with Coastal Commission staff to make this determination.
2. Of note, the term “navigable” under the Rivers & Harbors Act is defined much more narrowly than under the Clean Water Act, and applies only to waters subject to the ebb and flow of the tide and/or

are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

7 Summary

The potential options to treat-and-release, divert 100% of Ballona Creek flows to HWRP for beneficial reuse, or a hybrid approach are not expected to affect any of the sensitive species known to occur in the Ballona Creek watershed. The selected option for LFTF-1 is ultimately a balance between the desired certainty that WQOs will be attained at the outlet of Ballona Creek Reach 2 and the desire to utilize flows for potential reuse at HWRP. With 3 MGD of treatment at LFTF-1, WQOs could be attained under baseline critical conditions and 6 MGD of treatment could support attainment even if assumed baseline loading downstream of LFTF-1 increased by 54%. With regards to the differences in regulatory requirements among the potential scenarios, the primary consideration is that any diversion to HWRP may involve water rights permitting via the State Board and consultations and approvals by resource agencies regarding sensitive species. The process of gaining approval to meet the regulatory requirements can take a varying degree of time to complete and may affect the implementation schedule for LFTF-1. The hybrid scenario realizes the benefits related to both water quality (attainment of the TMDL) and water resources (offsetting potable supply through re-use at HWRP).

8 References

Audubon California, 2005 Audubon Ballona Wetlands Program. www.audubon-ca.org/ballonahm

Ballona Creek Watershed Management Group, 2009. Implementation Plan: Total Maximum Daily Load for Bacterial Indicator Densities in Ballona Creek, Ballona Estuary, and Sepulveda Channel. Prepared by City of Beverly Hills, City of Culver City, City of Los Angeles, City of Inglewood, City of Santa Monica, City of West Hollywood, County of Los Angeles, and Los Angeles County Flood Control District.

Ballona Creek Watershed Management Group. 2014. Enhanced Watershed Management Program (EWMP) Final Work Plan. Rep. City of Beverly Hills, City of Culver City, City of Los Angeles, City of Inglewood, City of Santa Monica, City of West Hollywood, County of Los Angeles, and Los Angeles County Flood Control District.

Ballona Creek Watershed Management Group. 2015a. Ballona Creek Enhanced Watershed Management Program (EWMP). Rep. City of Beverly Hills, City of Culver City, City of Los Angeles, City of Inglewood, City of Santa Monica, City of West Hollywood, County of Los Angeles, and Los Angeles County Flood Control District.

Ballona Creek Watershed Management Group. 2015b. Ballona Creek Coordinated Integrated Monitoring Program (CIMP). Rep. City of Beverly Hills, City of Culver City, City of Los Angeles, City of Inglewood, City of Santa Monica, City of West Hollywood, County of Los Angeles, and Los Angeles County Flood Control District.

California Department of Fish and Game. 2008. California Bird Species of Special Concern.

California Native Database. 2010. *Eriogonum parvifolium*. Theodore Payne Foundation for Wild Flower and Native Plants. www.theodorepayne.org/mediawiki/index.php?title=Eriogonum_parvifolium&redirect=no

California Native Plant Society. 2015. Inventory of Rare and Endangered Plants - 7th Edition Interface. cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Search?

CNDDDB: see California Natural Diversity Database

Collins, Paul W. 1998. Southern California Salt Marsh Shrew, *Sorex Ornatus Salicornicus*. Terrestrial Mammal Species of Special Concern in California: p 14-16. Bolster.

Cooper, Daniel S. 2005. Special Status Bird Species of the Ballona Wetlands. Cooper Ecological Monitoring.

Cornell Lab of Ornithology. No Date A Burrowing Owl All About Birds. www.allaboutbirds.org/guide/Burrowing_Owl/lifehistory#at_habitat

Cornell Lab of Ornithology. No Date B Loggerhead Shrike. All About Birds. www.allaboutbirds.org/guide/Loggerhead_Shrike/lifehistory#at_habitat

Fish and Wildlife Service. 1998. Draft recovery plan for the least Bell's Vireo. U.S. Fish and Wildlife Service, Portland, OR. 139pp. pg 10-11

Friends of Ballona Wetlands. 2013 We've Got The Blues! Friends' 7th Annual Butterfly Count. Ballona Friends.

Friends of Ballona Wetlands. 2015. Habitats at Ballona. www.ballonafriends.org/habitat.html

Green, Jared. 2012. "Playa Vista Overcomes Its Obstacles. The Dirt: Uniting the Built and Natural Environments. American Society of Landscape Architects. dirt.asla.org/2012/04/25/playa-vista-overcomes-its-obstacles.

GreenInfo Network. 2008. Existing Habitat Units: Native. DRAFT Friends of Ballona Wetlands and Coastal Conservancy. www.ballonafriends.org/habitat_trails.html.

Hamilton, W. J. 2004. Tricolored Blackbird (*Agelaius tricolor*). In The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. www.prbo.org/calpif/htmldocs/riparian_v-2.html

Jennings, Mark R., and Marc P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game.

Johnston, K.K., Del Giudice-Tuttle, E., Medel, I.D., Piechowski, C.J., Cooper, D.S., Dorsey, J., and Anderson, S. 2012. The Ballona Wetlands Ecological Reserve Baseline Assessment Program: Second Year Report. Santa Monica Bay Restoration Commission. Prepared for the California State Coastal Conservancy, Los Angeles, California.

Johnston, Karina, Ivan Medel, and Chris Solek. 2015. "Condition Assessment of the Wetland Habitats in the Ballona Wetlands Ecological Reserve,." Letter to California State Coastal Conservancy US Environmental Protection Agency California Department of Fish and Wildlife. MS. Los Angeles, CA.

Josselyn, M, S. Chamberlain, P. Goodwin, and K. Cuffe. No date. DRAFT Wetland Inventory and Restoration Potential. Santa Monica Bay Restoration Project. Prepared for: Santa Monica Bay Restoration Project, 101 Centre Plaza Dr., Monterey Park, CA 91754.

Lantz, Sarah J., Hamilton Smith, and Douglas A. Keinath. 2004. Species Assessment for Western Burrowing Owl (*Athene Cunicularia Hypugaea*) in Wyoming. Rep. Cheyenne, Wyoming: United States Department of the Interior Bureau of Land Management Wyoming State Office.

Kaufman, Kenn. 1996a. Yellow Warbler: *Setophaga petechia*. Guide to North American Birds. National Audubon Society. www.audubon.org/fieldguide/bird/yellowwarbler

Kaufman, Kenn. 1996b Vesper Sparrow: *Pooecetes gramineus*. Guide to North American Birds. National Audubon Society. www.audubon.org/fieldguide/bird/vespersparrow

Los Angeles Times. 2005. Rare bird sightings. www.latimes.com/features/outdoors/la-os-bird7june07,12449223.story?col=la=utilities-outdoors

LARWQCB and USEPA, 2005. TMDL for Toxic Pollutants in Ballona Creek Estuary. Los Angeles Regional Water Quality Control Board. Los Angeles, CA.

Los Padres Forest Watch. 2013. California Least Tern: *Sterna Antillarum* Browni. lpfw.org/our-region/wildlife/california-least-tern

Mitch Walte Group. No Date. "Tricolored Blackbird Behavior." Field Guide to Birds of North America. identify.whatbird.com/obj/552/behavior/Tricolored_Blackbird.aspx

Monarch Joint Venture and The Xerces Society for Invertebrate Conservation. 2012. International Environmental Law Project. The Legal Status of Monarch Butterflies in California.

Monitoring Plan Subcommittee, Los Angeles, Chair. 2009. Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL: Coordinated Monitoring Plan

Monitoring Plan Subcommittee, Los Angeles, Chair. 2015. Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL: TMDL Outfall Monitoring Plan. Submitted April 26, 2013.

Neighborhood Council of Westchester/Playa. No Date. "Ballona Freshwater Marsh." Representing the Communities of Westchester, Playa Del Rey and Playa Vista. www.ncwpdr.org/ballona-freshwater-marsh

Noble RT, Griffith JF, Blackwood AD, Fuhrman JA, Gregory JB, Hernandez X, Liang X, Bera AA, Schiff K. 2006. Multitiered approach using quantitative PCR to track sources of fecal pollution affecting Santa Monica Bay, California. *Appl Environ Microbiol.* Feb;72(2):1604-12.

Read, Edith. 2014. "Ballona Freshwater Wetlands Birds." Friends of Ballona. www.ballonafriends.org/docs/2014JanBirdList.pdf

Read, Edith. 2010. "Constructed Wetlands Help Achieve Water Quality and Conservation Goals at Ballona." *Urban Coast* (2010): 47-50.

Regional Water Quality Control Board – Los Angeles Region, 2010. Los Angeles River Watershed Bacteria TMDL – Staff Report. July 15, 2010.

Santa Monica Bay Audubon Society (SMBAS). 1999. Newsletter of the Santa Monica Bay Audubon Society. Vol 22 No. 5. February 1999.

Santa Monica Bay Audubon Society. 2001. Newsletter of the Santa Monica Bay Audubon Society. Vol 24 No. 7. April 2001.

S&S Seeds. 2014. *Salicornia Pacifica*: Pickleweed, Formerly *Salicornia Virginica*. www.ssseeds.com/plant-database/salicornia-pacifica/

State of California. 2015. The Natural Resource Agency. Department of Fish and Wildlife. State and Federally Listed Endangered and Threatened Animals of California.

The Watershed Nursery. 2012. "*Salicornia Pacifica*." California Native Plants and Habitat Enhancement Services. www.watershednursery.com/nursery/plantfinder/salicorniapacifica

U.S. Fish and Wildlife Service. 1998. Recovery Plan for the El Segundo blue butterfly (*Euphilotes battoides allyni*). Portland, Oregon. 67

U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*). In 2 volumes. Sacramento, California. xiv + 751 pages.

University of California Davis. No Date. "Legal Status." Tricolored Blackbird Portal. tricolor.ice.ucdavis.edu/node/442

Walker, Gary. 2010. "Endangered Birds' Nesting Draws Scientists' Attention to Restoration and Recovery Efforts." Argonaut Online. argonautnews.com/endangeredbirdsnestingdrawsscientistsattentiontorestorationandrecoveryefforts/

Wetlands Research Associates, Inc. 1990. Port of Los Angeles Local Wetland Mitigation Program. Prepared for Port of Los Angeles, 425 S. Palos Verdes St., San Pedro, Ca 90733. Prepared by Wetlands Research Associates, Inc., 2169-G E. Francisco Blvd., San Rafael, CA 94901.(includes: Zuma Beach, Malibu Lagoon, Topanga Cyn., Oxford Flood Control Channel, Venice Canals, Ballona Lagoon, Ballona Wetlands, Del Rey Lagoon, El Segundo Dunes, Madrona Marsh, Sanitary District Wetland, Machado Lake, and Cabrillo Tidal Salt Marsh.)

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

Appendix 1. Summary of Sensitive Species and Habitats in the Ballona Creek Area and Associated References

Common Name	Species Name	Status	Location	Known vs Suspected	Citation
Least Bell's Vireo	<i>Vireo bellii pusillus</i>	SE, FE ⁵³	FM, RC ²	Known ⁶	2,6,7,56
Belding's Savannah Sparrow	<i>Passerculus sandwichensis beldingi</i>	SE ⁵³	WL:B ⁴ SM ^(1,10)	Known ⁴	1,4,6,7,10,57,69
El Segundo Blue Butterfly	<i>Euphilotes battoides allyni</i>	FE ⁵³	US	Known ⁴	5,6,7,17
California Least Tern	<i>Sternula antillarum browni</i>	SE, FE ⁵³	FM, RC ² DRL, BCE ¹⁰	Known ²	1,2,6,7,10,59
Burrowing Owl	<i>Athene cunicularia</i>	CSC ^{10,30}	DRL, (channel levels only) SM ¹⁰	known ⁴	4,10,30,42,67,74
Least Bittern	<i>Ixobrychus exilis</i>	CSC ^{10,30}	FM, RC ²	known ²	2,10,30,43,62
Loggerhead Shrike	<i>Lanius ludovicianus</i>	CSC ³⁰	SM ¹⁰	known ⁴	4,30,44,65
Tricolored blackbird	<i>Agelaius tricolor</i>	SE ⁴⁶ , CSC ³⁰	FM, RC ²	known ²	2,30,46,50,63
Yellow warbler	<i>Dendroica petechia ssp. Brewsteri</i>	CSC ^{10,30}	FM,Dune Willows ¹⁰	known ²	2,10,30,54,64
South Coast Marsh Vole	<i>Microtus californicus stephensi</i>	CSC ⁴	WL:B ⁴	known ⁴	4
Orcutt's Yellow Pin Cushion	<i>Chaenactis glabriuscula var. orcuttiana</i>	S1 ⁴⁵	WL:B ⁴	known ³⁴	4,34,45,65
Vesper Sparrow	<i>Pooecetes gramineus</i>	CSC ^{24,30,32}	FM, RC ²	known ^{2,4}	2,4,24,30,32,37,66
California legless lizard	<i>Anniella pulchra</i>	CSC ^{4,32}	Dunes of Area B ⁴	known ⁴	4,32,67
Monarch Butterfly	<i>Danaus plexippus</i>	CSC ⁵⁴	SM/WL:B ⁴	known ⁴	4,54
Western Snowy Plover	<i>Charadrius alexandinus nivosus</i>	FT ⁵³	US	migratory use of area ⁶	6,7,61
Southern California Salt Marsh Shrew	<i>Sorex ornatus salicornicus</i>	CSC ^{24,27}	US	suspected ⁴	4,24,27,69
Salt Marsh Harvest Mouse	<i>Reithrodontomys raviventris</i>	SE, FE ⁵³	US	suspected ⁷	4,7,13,60
California Black Rail	<i>Laterallus jamaicensis coturniculus</i>	ST ⁵³	US	unknown	2,6,62
Light-footed clapper rail	<i>Rallus longirostris levipes</i>	SE, FE ⁵³	SM ⁽¹⁰⁾	no population maintained at BWER ⁴ Totally Extirpated (two records since 1950) ¹⁰	8,15,64
California Gnatcatcher	<i>Poliptila californica californica</i>	ST, FT ⁵³	US	Either extirpated prior to 1900, or always scarce (not enough information) ¹⁰	3,4,6,7,20,58

Common Name	Species Name	Status	Location	Known vs Suspected	Citation
Pacific Pocket Mouse	<i>Perognathus longimembris pacificus</i>	FE ⁵³	US	believed extirpated ⁶	6,53, 66
Riverside Fairy Shrimp	<i>Streptocephalus woottoni</i>	FE ⁵³	US	believed extirpated ⁶	6,53
Pacific pickleweed	<i>Salicornia pacifica</i>		found in all 3 areas (salt marsh, "other" marsh, and upland) Salicornia was found in low, mid and high marsh areas of the Ballona Area and in Seasonal wetlands A and B ⁴	known	

Key

SE = State Endangered FM = Freshwater Marsh DRL = Del Rey Lagoon
FE = Federally Endangered SM = Saltmarsh WL = Wetlands (areas ABC)
FT = Federally Threatened RC = Riparian Corridor US = Unspecified
ST = State Threatened BCE = Ballona Creek Estuary
CSC = California Species of Special Concern R2 = Reach 2

Common Name	Special Habitat
Least Bell's Vireo	"NESTS PLACED ALONG MARGINS OF BUSHES OR ON TWIGS PROJECTING INTO PATHWAYS, USUALLY WILLOW, BACCHARIS MESQUITE" ⁶
Belding's Savannah Sparrow	"NESTS IN SALICORNIA ON AND ABOUT MARGINS OF TIDAL FLATS" ⁶ "utilizes Salicornia pacifica (common pickleweed) or other salt marsh related species, including Distichlis spicata (saltgrass) and Arthrocnemum subterminale (Parish's pickleweed)" ⁴
El Segundo Blue Butterfly	"HOSTPLANT IS ERIOGONUM PARVIFOLIUM; LARVAE FEED ONLY ON THE FLOWERS AND SEEDS; USED BY ADULTS AS MAJOR NECTAR SOURCE" ⁶
California Least Tern	"COLONIAL BREEDER ON BARE OR SPARSELY VEGETATED, FLAT SUBSTRATES: SAND BEACHES, ALKALI FLATS, LAND FILLS, OR PAVED AREAS." ⁶

Common Name	Special Habitat
Burrowing Owl	"Lives in dry, open areas with no trees and short grass. Found on golf courses, cemeteries, airports, vacant lots, university campuses, pastures, and prairie dog towns." ⁴²
Least Bittern	"Freshwater or brackish marshes with tall emergent vegetation." ⁴³
Loggerhead Shrike	"inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns." ⁴⁴
Tricolored blackbird	"Preferred habitats include annual grasslands, wet and dry vernal pools, and other seasonal wetlands." ⁵⁰
Yellow warbler	"On their wintering grounds Yellow Warblers live in mangrove forests, dry scrub, marshes, and forests, typically in lowlands but occasionally up to 8,500 feet elevation." ⁵²
South Coast Marsh Vole	salt marsh ⁴
Orcutt's Yellow Pin Cushion	"Coastal bluff scrub, coastal dunes. Located on sandy soils. Elevation range: 10 – 330 feet. Blooms: January – August." ⁴
Vesper Sparrow	"Found in various open habitats with grass, including prairie, sagebrush steppe, meadows, pastures, and roadsides." ³⁷
California legless lizard	Dunes ⁴
Monarch Butterfly	milkweeds ⁵⁴
Western Snowy Plover	"SANDY BEACHES, SALT POND LEVEES & SHORES OF LARGE ALKALI LAKES" ⁶
Southern California Salt Marsh Shrew	"the species' habitat is Salicornia marshes" ²⁷
Salt Marsh Harvest Mouse	"Salt marshes are the optimal habitat for this species, in particular those that support dense stands of pickleweed and are adjacent to upland, salt-tolerant vegetation, for escape during high tides" ⁶⁰
California Black Rail	"INHABITS FRESHWATER MARSHES, WET MEADOWS & SHALLOW MARGINS OF SALTWATER MARSHES BORDERING LARGER BAYS." ⁶
Light-footed clapper rail	"Nesting occurs primarily in dense cordgrass, wrack deposits, and in hummocks of high marsh within the low marsh zone" ¹⁵
California Gnatcatcher	"HABITAT IS COASTAL SAGE SCRUB, DOMINATED BY ARTEMISIA CALIFORNICA, ERIOGONUM FASCICULATUM, AND SALVIA MELLIFERA" ⁶
Pacific Pocket Mouse	"SEEMS TO PREFER SOILS OF FINE ALLUVIAL SANDS NEAR THE OCEAN, BUT MUCH REMAINS TO BE LEARNED." ⁶
Riverside Fairy Shrimp	"ENDEMIC TO W RIV, ORA & SDG COUNTIES IN AREAS OF TECTONIC SWALES/EARTH SLUMP BASINS IN GRASSLAND & COASTAL SAGE SCRUB. INHABIT SEASONALLY ASTATIC POOLS FILLED BY WINTER/SPRING RAINS. HATCH IN WARM WATER LATER IN THE SEASON" ⁶
Pacific pickleweed	Water Requirements: medium; Salt Tolerance: medium ⁶⁹

Common Name	Special Habitat
Least Bell's Vireo	<p>"Least Bell's vireos nest primarily in Willows (<i>Salix</i> spp.) but also use a variety of other shrub and tree species for nest placement (Gray and Greaves 1984, Salata 1987). Least Bell's vireos forage in riparian and adjoining upland habitats (Salata 1983, Kus and Miner 1987). Preliminary studies of vireo foraging behavior along the Santa Ynez River and within the Mono Creek Basin (Santa Barbara County) indicated that a large percentage of their foraging may occur in the adjacent chaparral community up to 300 or more yards from the nest"⁵⁵</p> <p>"Obligate Riparian Breeders, inhabiting structurally diverse woodlands along watercourses. Riparian habitat types include cottonwood-willow woodlands/forests, oak woodlands, and mule fat scrub. Willows and other species form dense thickets in approx 5-10 years and become suitable habitat. Nest placement occurs in openings and along the riparian edge, where exposure to sunlight allows the development of shrubs. Extend their activities to adjacent upland habitats primarily for foraging and when flood waters inundate adjacent riparian habitat- during these conditions they may nest exclusively in non-riparian habitat"⁵⁶</p>
Belding's Savannah Sparrow	<p>"Although Belding's occurred in greatest numbers and densities in marshes with full tidal flushing (Zemba et al. 1987), they did not appear to nest abundantly on frequently wetted substrate. Most of the high marsh left in southern California is artificially separated from full tidal influence by berms and roads. The dampened tidal conditions result in drier substrate that is probably more conducive to successful incubation and early chick survival, particularly during unusually cold, wet springs. However, enough tidal influence to retain salt marsh vegetation and hydrologic characteristics is required to keep upland plants and birds from replacing the Belding's and its habitat (Zemba et al. 1985) and to temper depredation, particularly by snakes. Most of the southern California marshes are flooded during rains and in those with poor tidal exchange, the impounded water lingers. When the rains come late, slowly draining or stagnant impoundments preclude Belding's nesting in vast areas of upper marsh. When the substrate is wetted enough to support brackish marsh habitat for these species, Belding's are precluded. One may observe a male singing but nesting will not happen due to the constantly wetted substrate, wrong cover type, and competition particularly with the song sparrows. On the upper edge of the saltmarsh, Belding's are limited by both the extent and vigor of pickleweed cover and the proximity of other, particularly upland habitats and associated species."⁵⁷</p>
El Segundo Blue Butterfly	<p>"<i>Eriogonum parvifolium</i> was found in "other marsh" meaning seasonal brackish, and freshwater wetlands types, also in upland scrub, dune and grassland habitat types⁴ There has been an effort in recent years to bring back this species of buckwheat in order to increase EL Segundo Blue Butterfly numbers"¹⁷</p>
California Least Tern	<p>"Terns require an undisturbed stretch of sparsely vegetated sandy or gravelly ground near a lagoon, estuary or bay in order to nest. California least terns make simple, shallow depressions in the ground to lay their eggs, occasionally decorating it with a few pebbles, shells or debris. The terns prefer very low vegetation densities; unfortunately this leaves nests in the open and blended with the sand, making it difficult for passersby to avoid them. Terns hunt for food in shallow water bodies and take turns feeding their young"⁵⁹</p>
Burrowing Owl	<p>"Open, dry, treeless areas on grasslands, shrublands, and desert floors, Gentle slopes, short vegetation, high percentages of bare ground, High densities of burrows, Current activity of burrowing mammals, primarily prairie dogs, Close proximity to other nesting Burrowing Owls, Dried manure from cows, horses, or bison".⁶⁷ Burrowing Owls require a mammal burrow or natural cavity surrounded by sparse vegetation. Burrow availability is often limiting in areas lacking colonial burrowing rodents"⁷⁴</p>
Least Bittern	<p>"Fresh marshes, reedy ponds. Mostly freshwater marsh but also brackish marsh, in areas with tall, dense vegetation standing in water. May be over fairly deep water, because it mostly climbs in reeds rather than wading. Sometimes in salt marsh or in mangroves."⁶²</p>

Common Name	Special Habitat
Loggerhead Shrike	"They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles". ⁴⁴ "Semi-open country with lookout posts; wires, trees, scrub. Breeds in any kind of semi-open terrain, from large clearings in wooded regions to open grassland or desert with a few scattered trees or large shrubs. In winter, may be in totally treeless country if fences or wires provide hunting perche"s ⁶⁵
Tricolored blackbird	"Dominant nest substrate species: cattails, bulrushes, Himalaya berry, agricultural silage. A variety of other plant species are used as nesting substrate, all either flooded, spinous or otherwise defended against easy access by mammalian predators. In marshes dense vegetation is preferred but heavily lodged cattails not burned in recent years may preclude settlement. Biennial burning is a preferred management strategy. Tricolors often settle in cattails burned the same season. Tricolors will not settle without access to open water. Strips of emergent vegetation along canals are avoided as nest sites unless they are about 10 or more m wide but in some ponds, especially where associated with Himalayan blackberries and deep water, settlement may be in narrower fetches of cattails. If sites are hard for an observer to reach, the site it is relatively suitable." ⁶³
Yellow warbler	"Bushes, swamp edges, streams, gardens. Breeds in a variety of habitats in east, including woods and thickets along edges of streams, lakes, swamps, and marshes, favoring willows, alders, and other moisture-loving plants. Also in dryer second-growth woods, orchards, roadside thickets. In west, restricted to streamside thickets. In winter in the tropics, favors semi-open country, woodland edges, towns." ⁶⁴
South Coast Marsh Vole	Salt marsh
Orcutt's Yellow Pin Cushion	"Generally dry open places, sometimes dunes or serpentine" ⁶⁵
Vesper Sparrow	"Meadows, fields, prairies, roadsides. At all seasons, favors open grassy or weedy fields, often in rather dry situations with much open soil. May be in weedy roadsides, gravel pits, high mountain grasslands, stubble fields, grassy areas just above sandy beaches. Often breeds where there are a few taller plants for use as song perches." ⁶⁶
California legless lizard	"Feeding: This lizard usually forages at the base of shrubs or other vegetation either on the surface or just below it in leaf litter or sandy soil. Legless lizards eat insect larvae, small adult insects, and spiders (Stebbins 1954).Cover: Legless lizards sometimes seek cover under surface objects such as flat boards and rocks where they lie barely covered in loose soil. They are often encountered buried in leaf litter and commonly burrow near the surface through loose soil. Reproduction: Little is known about specific habitat requirements for courtship and breeding. Live young are born in the fall. Water: Little information on water requirements. Legless lizards are often found where substrates are slightly moist. Miller (1944) reported that moisture is an essential habitat requirement. Pattern: Found primarily in areas with sandy or loose organic soils or where there is plenty of leaf litter". ⁶⁷
Monarch Butterfly	Milkweeds

Common Name	Special Habitat
Western Snowy Plover	<p>"The Pacific coast population of the western snowy plover breeds primarily above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries. Less common nesting habitats include bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and river bars. In winter, western snowy plovers are found on many of the beaches used for nesting as well as on beaches where they do not nest, in man-made salt ponds, and on estuarine sand and mud flats. Western snowy plovers are primarily visual foragers, using the run-stop-peck method of feeding typical of Charadrius species. They forage on invertebrates in the wet sand and amongst surf-cast kelp within the intertidal zone, in dry sand areas above the high tide, on salt pans, on spoil sites, and along the edges of salt marshes, salt ponds, and lagoons. They sometimes probe for prey in the sand and pick insects from low-growing plants."⁶¹</p>
Southern California Salt Marsh Shrew	<p>"Grinnell (1933) described the species' habitat as Salicornia marshes. At the Seal Beach National Wildlife Refuge it occurred in salt marsh dominated by Salicornia virginica; at Bolsa Chica Ecological Reserve, it occurred in dense Salicornia and salt grass (Feldmeth et al. 1989). Its occurrence in association with dense willow (Salix spp.) and bulrush (Scirpus sp.) thickets near Point Mugu (J. Maldonado pers. comm.) suggests it occurs in a broader range of wetland habitats than first thought. The habitat characteristics of southern California salt marsh shrews may be similar to those which Johnston and Rudd (1957) recorded for other salt marsh-inhabiting populations of ornate shrew: dense vegetative ground cover, protected nesting sites above mean high tide which are free from inundation, and moist surroundings."²⁷</p>
Salt Marsh Harvest Mouse	<p>"The ability to tolerate high salinity in both food (grasses, forbs, seeds, and insects) and water, and the ability to swim and climb enable this mouse to take advantage of its unique habitat."⁶⁰ "cover-dependent species. That is, they only live under thick vegetation. They are dependent on thick cover of native halophytes (plants that thrive in salty environments) of the salt marsh environment, which is typified by salt marsh herbs, grasses and reeds. Salt marsh harvest mice use pickleweed (Salicornia virginica) as their primary/preferred habitat as long as they have non-submerged, salt-tolerant vegetation for escape during the highest tides (Fisler, 1965). They eat leaves and stems of halophytes. The mice prefer the deepest (60-75 cm tall), most dense pickleweed, which is intermixed with fat hen (Atriplex patula) and alkali heath (Frankenia grandifolia). The mice are non-intra-aggressive; therefore, short durations of populations' densities are sustainable (for the high tide period). High tide's refuge is taken in the upper zones of marshes, usually in the stands of fat hen and Australian salt brush (Atriplex semibaccata). Marshlands with low salinities and sparse pickleweed are not utilized by the mice"¹³</p>
California Black Rail	<p>"Suitable California black rail habitat generally includes salt marshes, freshwater marshes, and wet meadows. Most or all southwestern U.S. populations are nonmigratory, and these habitat types serve for breeding, foraging, and overwintering."⁶²</p>
Light-footed clapper rail	<p>"Dense cord grass provides a highly utilized habitat, but all of a marsh and its environs are used to some degree. A most productive situation is apparently provided by a large marsh comprised of numerous habitats."⁶⁴</p>

Common Name	Special Habitat
California Gnatcatcher	"Ground- and shrub-foraging insectivore. Generally 'prefers open sage scrub with California sagebrush (<i>Artemisia californica</i>) as a dominant or co-dominant species (summarized in Atwood and Bontrager 2001). More abundant near sage scrub-grassland interface than where sage scrub grades into chaparral. Dense sage scrub occupied less frequently than more open sites. Mostly absent from coastal areas dominated by black sage (<i>Salvia mellifera</i>), white sage (<i>S. leucophylla</i>), or lemonadeberry (<i>Rhus integrifolia</i>). Nest placement typically in areas with less than 40 percent slope gradient. Gullies and drainages, when available within territory, used as nest sites. Use proportional to shrub species availability: typically California sagebrush, California buckwheat (<i>Eriogonum fasciculatum</i>), California sunflower (<i>Encelia californica</i>), broom baccharis (<i>Baccharis sarothroides</i>), and laural sumac (<i>Malosma laurina</i>). Many other less common sage scrub species used less frequently" ⁵⁸
Pacific Pocket Mouse	"Occurs on fine-grain, sandy substrates and inhabited coastal strand, coastal dunes, river alluvium, and coastal sage scrub habitats growing on marine terraces within approximately 4 kilometers (2.5 miles) of the ocean. Currently, the species is found predominantly on sandy substrates within coastal sage scrub habitats." ⁶⁶
Riverside Fairy Shrimp	Seasonal pools
Pacific pickleweed	Salt water marsh

Common Name	Comments
Least Bell's Vireo	No additional comments
Belding's Savannah Sparrow	"Belding's Savannah Sparrow is concentrated in Area B of the Ballona Wetlands" ⁴ "Salicornia was found in low, mid and high marsh areas of the Ballona Area and in Seasonal wetlands A and B" ⁴ "Salicornia= Water Requirements: medium; Salt Tolerance: medium" ⁶⁹
El Segundo Blue Butterfly	No additional comments
California Least Tern	"forage in Ballona Cr., Ballona Lagoon, at Ballona Freshwater Marsh and at seasonal pools at Playa Vista (rarely in tidal channels)" ¹⁰
Burrowing Owl	No additional comments
Least Bittern	No additional comments
Loggerhead Shrike	No additional comments
Tricolored blackbird	"The tricolored blackbird was given emergency Endangered status under the California Endangered Species Act in December, 2014. This listing provided temporary (6 month) protection but is expected to be renewed. The species is currently under review by the California Department of Fish and Wildlife for permanent protection (under the population is recovered for several years)." ⁴⁶
Yellow warbler	No additional comments
South Coast Marsh Vole	No additional comments
Orcutt's Yellow Pin Cushion	No additional comments

Vesper Sparrow	location range extends in to ballona in winter ³¹
California legless lizard	"The California legless lizard (<i>Anniella pulchra</i>), a California Species of Special Concern, was confirmed on site in the dune habitats of Area B in the first Baseline year (Johnston et al. 2011). In order to minimize habitat disturbance, legless lizard survey protocols were not repeated in the second year." ⁴
Monarch Butterfly	no data to support that milkweed is actually in Ballona
Western Snowy Plover	No additional comments
Southern California Salt Marsh Shrew	"The southern California saltmarsh shrew was found in previous surveys in Area B (Friesen et al. 1981, Frank Hovore and Associates 1991), but not in subsequent surveys or reports. While the Baseline program did not identify this species on site, areas that may contain suitable habitat for the California saltmarsh shrew will continue to be surveyed during the next monitoring" ⁴
Salt Marsh Harvest Mouse	" <i>Salicornia pacifica</i> was found in all 3 areas (salt marsh, "other" marsh, and upland)" ⁴ <i>Salicornia</i> was found in low, mid and high marsh areas of the Ballona Area and in Seasonal wetlands A and B" ⁴
California Black Rail	No additional comments
Light-footed clapper rail	No additional comments
California Gnatcatcher	" <i>ARTEMISIA CALIFORNICA</i> is common in sage scrub and coastal strand on dry slopes ¹⁸ found "upland in SMBRC study ⁴ <i>ERIOGONUM FASCICULATUM</i> is Common and found on dry slopes, washes, canyons in scrub ¹⁹ <i>S. mellifera</i> is common and found in coastal-sage scrub, lower chaparral" ²⁰
Pacific Pocket Mouse	No additional comments
Riverside Fairy Shrimp	No additional comments
Pacific pickleweed	No additional comments

Citations

- 1 Ballona Institute. 2008. "Fauna and Flora of Ballona." Ballona Institute.<<http://www.ballonainstitute.org/discover.html>>
- 2 Read, Edith. 2014. "BALLONA FRESHWATER WETLANDS BIRD." : n. pag.*Friends of Ballona*. 2014. Web. 6 Apr. 2015. <<http://www.ballonafriends.org/docs/2014JanBirdList.pdf>>.
- 3 Department of the Interior: Fish and Wildlife Service. 2007. "Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Poliophtila Californica Californica*)." 72.243: 72175. *Federal Register*.

Citations

- 4 Johnston, K.K., Del Giudice-Tuttle, E., Medel, I.D., Piechowski, C.J., Cooper, D.S., Dorsey, J., and Anderson, S. 2012. "The Ballona Wetlands Ecological Reserve Baseline Assessment Program: Second Year Report." Santa Monica Bay Restoration Commission. Prepared for the California State Coastal Conservancy, Los Angeles, California.
- 5 US Fish and Wildlife Service. 1998. "Recovery Plan for the El Segundo Blue Butterfly (*Euphilotes Battoides Allynii*)." p. 1,15-17. Print
- 6 CNDDDB: see California Natural Diversity Database.
- 7 Ballona Institute. 2014. "Protected by Law." Protect Ballona Wetlands.
- 8 Department of the Interior. U.S Fish and Wildlife Service. No Date. United States. "Species Profile for Light-Footed Clapper Rail (*Rallus Longirostris Levipes*)." Environmental Conservation Online System.
- 9 U.S Fish and Wildlife Service. No Date. United States. Department of the Interior. Species Profile for California Red-legged Frog (*Rana Draytonii*). Environmental Conservation Online System.
- 10 Cooper, Daniel S. 2005. "Special Status Bird Species of the Ballona Wetlands." Cooper Ecological Monitoring. Cooper Ecological Monitoring
- 11 Yorke, Callyn. 2014. "Birds Of Southern California: Inland and Coastal Los Angeles County." Palos Verdes Bird Surveys. <<http://avconline.avc.edu/cyorke/fieldnotes/PalosVerdesBirdSurveys.html#n>>
- 12 Department of the Interior. No Date. United States. U.S Fish and Wildlife Service. Species Profile for Brown Pelican (*Pelicanus Occidentalis*). Environmental Conservation Online System. Web.
- 13 GOLOVANOVA, GALINA. 2005. "The Biogeography of the Salt Marsh Harvest Mouse (*Reithrodonomys Raviventris*)." BIOGEOGRAPHY OF SALT MARSH HARVEST MOUSE. Ed. Barbara Holzman. San Francisco State University. Web. 15 Apr. 2015. <http://web.archive.org/web/20100116090555/http://bss.sfsu.edu/holzman/courses/Spring%2005%20projects/SMH%20mouse/salt_marsh_harvest_mouse%202.htm>.
- 14 Cornell Lab of Ornithology. No Date. "Peregrine Falcon." All About Birds.
- 15 Center for Biological Diversity. No Date. "Light-footed Clapper Rail (U.S. DPS)." <http://www.biologicaldiversity.org/campaigns/esa_works/profile_pages/LightFootedClapperRail.html>.
- 16 National Wildlife Federation. No Date. "California Red Legged Frog." <<http://www.nwf.org/wildlife/wildlife-library/amphibians-reptiles-and-fish/california-red-legged-frog.aspx>>.
- 17 Friends of Ballona Wetlands. 2013. "We've Got The Blues! Friends' 7th Annual Butterfly Count." Ballona Friends.
- 18 Montalvo, Arlee M., and Catherine E. Koehler. No Date. *Artemisia Californica* Less. United States Department of Agriculture. Forrest Service. <<http://www.fs.fed.us/global/iitf/pdf/shrubs/Artemisia%20californica.pdf>>.

Citations

- 19 Hickman, James C. 1993a. "TREATMENT FROM THE JEPSON MANUAL." Jepson Manual Treatment for *E. Fasciculatum*. Reagents of the University of California. <http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?5936%2C5994%2C6045>.
- 20 Hickman, James C. 1993b. "TREATMENT FROM THE JEPSON MANUAL." Jepson Manual Treatment for *S. Mellifera*. Reagents of the University of California. <http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?Salvia+mellifera>
- 21 U.S. Fish and Wildlife Service. No Date A. United States. Department of the Interior. Species Profile for California red-legged frog (*Rana draytonii*). Environmental Conservation Online System.
- 22 U.S. Fish and Wildlife Service. No Date B. United States. Department of the Interior. Species Profile for Gambel's watercress (*Rorippa gambellii*). Environmental Conservation Online System.
- 23 Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
- 24 Ballona Institute 2008. "More Imperiled Species." Protect Ballona Wetlands. <<http://protectballonawetlands.org/page11/page28/index.html>>.
- 25 East Contra Costa County. No Date. "Silvery Legless Lizard (*Anniella Pulchra Pulchra*)." Species Accounts: Reptiles (2006): 1-2.
- 26 Maryland Department of Natural Resource. 2010. "Widgeon Grass *Ruppia Maritima*." Bay Grass ID Key Identify SAV. <http://www.dnr.state.md.us/bay/sav/key/widgeon_grass.asp>.
- 27 Collins, Paul W. 1998. "Southern California Salt Marsh Shrew, *Sorex Ornatus Salicornicus*." Terrestrial Mammal Species of Special Concern in California: 14-16. Bolster. Web. 16 Apr. 2015
- 28 Bureau of Land Management. No Date. US Department of the "Biotic Dimension, Site Characterization, California Coastal National Monument, Bureau of Land Management California. Interior.<http://www.blm.gov/ca/st/en/prog/blm_special_areas/nm/ccnm/site_characterization/biotic.print.html
- 29 "Black Oystercatcher." All About Birds. Cornell Lab of Ornithology, n.d. Web. 16 Apr. 2015
- 30 California Department of Fish and Game. 2008. "California Bird Species of Special Concern."
- 31 Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds, Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento. pg 377
- 32 Jennings, Mark R., and Marc P. Hayes. "Amphibian and Reptile Species of Special Concern in California." California Department of Fish and Game (1994): n. pag. Print.
- 33 Papenfuss, and Parham. "Temblor Legless Lizard - *Anniella Alexanderae*." California Herps. N.p., 2013. Web. 16 Apr. 2015. <<http://www.californiaherps.com/lizards/pages/a.alexandrae.html>>

Citations

- 34 Sahagun, Louis. 2010. "Discovery of Rare Wildflower in Ballona Wetlands Could Halt Recreation Project." Los Angeles Times.
- 35 "Blainville's Horned Lizard *Phrynosoma*." California Herps. N.p., n.d. Web. 16 Apr. 2015. <<http://www.californiaherps.com/lizards/pages/p.blainvillii.html>>.
- 36 "Western Sandspurrey: *Spergularia canadensis* var. *occidentalis*" Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2015. Berkeley, California: The Calflora Database [a nonprofit organization]. Available: <http://www.calflora.org/> (Accessed: Apr 16, 2015).
- 37 Cornell Lab of Ornithology. No Date A. "Vesper Sparrow." All About Birds. <http://www.allaboutbirds.org/guide/Vesper_Sparrow/lifehistory#at_habitat>
- 38 "Vernal Barley: *Hordeum intercedens*" Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2015. Berkeley, California: The Calflora Database [a nonprofit organization]. Available: <http://www.calflora.org/> (Accessed: Apr 16, 2015).
- 39 "South Coast Branching Phacelia: *Phacelia ramosissima* var. *austrolitoralis*" Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2015. Berkeley, California: The Calflora Database [a nonprofit organization]. Available: <http://www.calflora.org/> (Accessed: Apr 16, 2015).
- 40 "Alkali Barley: *Hordeum depressum*" Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2015. Berkeley, California: The Calflora Database [a nonprofit organization]. Available: <http://www.calflora.org/> (Accessed: Apr 16, 2015).
- 41 Cornell Lab of Ornithology. No Date B. "Western Meadowlark" All About Birds. <http://www.allaboutbirds.org/guide/Western_Meadowlark/lifehistory#at_habitat>
- 42 Cornell Lab of Ornithology. No Date C. "Burrowing Owl" All About Birds. <http://www.allaboutbirds.org/guide/Burrowing_Owl/lifehistory#at_habitat>
- 43 Cornell Lab of Ornithology. No Date D. "Least Bittern." All About Birds. <http://www.allaboutbirds.org/guide/Least_Bittern/lifehistory>
- 44 Cornell Lab of Ornithology. No Date E. "Loggerhead Shrike." All About Birds. <http://www.allaboutbirds.org/guide/Loggerhead_Shrike/lifehistory#at_habitat>
- 45 Inventory of Rare and Endangered Plants - 7th Edition Interface. California Native Plant Society, 6 Apr. 2015. Web. 16 Apr. 2015. <<http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Search?>>.
- 46 University of California Davis. No Date. "Legal Status." Tricolored Blackbird Portal. <<http://tricolor.ice.ucdavis.edu/node/442>>.
- 47 Cornell Lab of Ornithology. No Date F. "Marbled Godwit." All About Birds. <http://www.allaboutbirds.org/guide/Marbled_Godwit/lifehistory#at_habitat>
- 48 Short, F.T., Carruthers, T.J.R., Waycott, M., Kendrick, G.A., Fourqurean, J.W., Callabine, A., Kenworthy, W.J. & Dennison, W.C. 2010. *Ruppia maritima*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 16 April 2015.
- 49 "Arrow grass: *Triglochin concinna*" Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2015. Berkeley, California: The Calflora Database [a nonprofit organization]. Available: <http://www.calflora.org/> (Accessed: Apr 16, 2015).

Citations

- 50 Mitch Walte Group. No Date. "Tricolored Blackbird Behavior." Field Guide to Birds of North America. <http://identify.whatbird.com/obj/552/behavior/Tricolored_Blackbird.aspx>.
- 51 Read, Edith. 2010. "Constructed Wetlands Help Achieve Water Quality and Conservation Goals at Ballona." Urban Coast: 47-50.
- 52 Cornell Lab of Ornithology. No Date E. "Yellow Warbler" All About Birds. <http://www.allaboutbirds.org/guide/Yellow_Warbler/lifehistory#at_habitat>
- 53 State of California. 2015. The Natural Resource Agency. Department of Fish and Wildlife. STATE & FEDERALLY LISTED ENDANGERED & THREATENED ANIMALS OF CALIFORNIA.
- 54 Monarch Joint Venture and The Xerces Society for Invertebrate Concervation. International Environmental Law Project. 2012. "The Legal Status of Monarch Butterflies in California."
- 55 Fish and Wildlife Service. 1998. "Endangered and Threatened Wildlife and Plants; Deisgnation of Critical Habitat for the Least Bell's Vireo." Rep. no. 50 CFR Part 17. 22nd ed. Vol. 59. Department of the Interior. Print. Federal Register.
- 56 Fish and Wildlife Service. 1998. Draft recovery plan for the least Bell's Vireo. U.S. Fish and Wildlife Service, Portland, OR. 139pp. pg 10-11
- 57 Zembal, R. and S. M. Hoffman. 2010. A survey of the Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*) in California, 2010. Calif. Dep. Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2010-10, Sacramento, CA pg 4
- 58 Mock, P. 2004. California Gnatcatcher (*Poliopitila californica*). In The Coastal Scrub and Chaparral Bird Conservation Plan: a strategy for protecting and managing coastal scrub and chaparral habitats and associated birds in California. California Partners in Flight. <http://www.prbo.org/calpif/htmldocs/scrub.html>
- 59 Los Padres Forest Watch. 2013. "California Least Tern: *Sterna Antillarum Browni*." <<http://lpfw.org/ourregion/wildlife/californialeasttern/>>
- 60 Environmental Protection Agency. No Date. United States. Office of Pesticide Programs. "Endangered Species Facts: Salt Marsh Harvest Mouse. Environmental Protection Agency." <<http://www.epa.gov/espp/>>.
- 61 U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*). In 2 volumes. Sacramento, California. xiv + 751 pages.
- 62 Kaufman, Kenn. 1996a "Least Bittern: *Ixobrychus Exilis*." Guide to North American Birds. National Audubon Society.
- 63 Hamilton, W. J. 2004. Tricolored Blackbird (*Agelaius tricolor*). In The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html
- 64 Kaufman, Kenn. 1996b. " Yellow Warbler: *Setophaga petechia*." Guide to North American Birds. National Audubon Society. <<http://www.audubon.org/fieldguide/bird/yellowwarbler>>
- 65 Hickman, James C. 1993. "TREATMENT FROM THE JEPSON MANUAL." Jepson Manual Treatment for *C. glabriuscula* DC. Regents of the University of California. <http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?609,890,900>

Citations

- 66 Kaufman, Kenn. 1996c. "Vesper Sparrow: *Pooecetes gramineus*." Guide to North American Birds. National Audubon Society. <<http://www.audubon.org/fieldguide/bird/vespersparrow>>
- 67 Zeiner, D.C., W.F.Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.
- 68 Las Pilitas Nursery. No Date. "Suaeda Taxifolia: Woolly Sea-blite." <<http://www.laspilitas.com/nature-of-california/plants/1173-suaeda-taxifolia>>.
- 69 S&S Seeds. 2014 "Salicornia Pacifica: Pickleweed, Formerly Salicornia Virginica." <<http://www.ssseeds.com/plant-database/salicornia-pacifica/>>.
- 70 U.S. Fish and Wildlife Service. 1998. Recovery Plan for the El Segundo blue butterfly (*Euphilotes batto ides allyni*). Portland, Oregon. 67
- 71 California Native Database. 2010. "Eriogonum Parvifolium." Theodore Payne Foundation for Wild Flower and Native Plants. http://www.theodorepayne.org/mediawiki/index.php?title=Eriogonum_parvifolium&redirect=no
- 72 The Watershed Nursery. 2012. "Salicornia Pacifica." California Native Plants and Habitat Enhancement Services. <<http://www.watershednursery.com/nursery/plantfinder/salicorniapacifica/>>.
- 73 Walker, Gary. 2010. "Endangered Birds' Nesting Draws Scientists' Attention to Restoration and Recovery Efforts." Argonaut Online. N.p., 17 June 2010. Web. 28 Apr. 2015. <<http://argonautnews.com/endangeredbirdsnestingdrawsscientistsattentiontorestorationandrecoveryefforts/>>.
- 74 Lantz, Sarah J., Hamilton Smith, and Douglas A. Keinath. 2004. Species Assessment for Western Burrowing Owl (*Athene Cunicularia Hypugaea*) in Wyoming. Rep. Cheyenne, Wyoming: United States Department of the Interior Bureau of Land Management Wyoming State Office.
-