



South Orange County Wastewater Authority  
34156 Del Obispo Street  
Dana Point, CA 92629

**Biological Resources Damage Assessment  
for the  
North Coast Interceptor Force Main Spill  
of  
November 27-29, 2019**

**Prepared by**

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## TABLE OF CONTENTS

1.0 INTRODUCTION .....	1
1.1 REGULATIONS AND REPORTING REQUIREMENTS .....	1
1.2 SPILL CHARACTERIZATION.....	3
2.0 BACKGROUND.....	3
2.1 ALISO CREEK SETTING .....	3
2.2 BIOLOGICAL RESOURCES .....	5
2.3 STREAM DISCHARGE.....	5
2.4 LITERATURE AND RECORDS REVIEW.....	7
2.4.1 Special-Status Plants.....	7
2.4.2 Special-Status Animals .....	7
2.4.3 Vegetation Communities.....	8
2.4.4 Critical Habitat.....	8
3.0 IMPACT ASSESSMENT METHODS .....	9
3.1 DELINEATION OF POTENTIAL IMPACT AREA AND SELECTION OF MONITORING SITES.....	9
3.2 MONITORING SITE DATA COLLECTION.....	10
4.0 SPILL MONITORING RESULTS.....	12
4.1 SUMMARY OF MONITORING EVENTS.....	12
4.2 CHARACTERISTICS OF BIOLOGICAL SURVEY SITES.....	12
4.3 POLLUTION INDICATORS .....	14
4.3.1 Visible Pollutants.....	14
4.3.2 Unusual Odor.....	14
4.3.3 Organic Matter .....	14
4.3.4 Surface Film or Foam .....	14
4.3.5 Algae Growth/Bloom.....	15
4.3.6 Water Clarity .....	15
4.3.7 Water Quality .....	16
4.3.8 Vegetation Impacts .....	18
4.3.9 Wildlife Presence and Behavior .....	18
5.0 SUMMARY AND DISCUSSION OF IMPACTS .....	20
6.0 REFERENCES CITED .....	23

### Figures

- Figure 1. North Coast Interceptor sewer line, Aliso Creek, and spill locations.  
Figure 2. Typical view of Aliso Creek within The Ranch golf course.  
Figure 3. Aliso Creek average hourly stream discharge in cubic feet per second (cfs) before, during, and after the sewage release of November 27-29, 2019.  
Figure 4. Biological assessment monitoring sites.  
Figure 5. Accumulation of organic matter on riprap at the spill location.  
Figure 6. Photograph of upstream (-600) site with algae growth/bloom.

**Tables**

Table 1. Hourly stream discharge during and following the spill event.

Table 2. Summary of parameters assessed at biological monitoring sites.

Table 3. Summary of monitoring events.

Table 4. Vegetation and habitat characteristics of biological monitoring sites.

Table 5. Water clarity at monitoring sites as indicated by approximate visible depth.

Table 6. Water quality indicators in samples collected at biological monitoring sites.

Table 7. Total Coliform (CFU/100 ml) in samples collected at beach sites.

Table 8. Wildlife species observed at biological monitoring sites.

**Appendices**

Appendix A. Likelihood of Special-Status Species Occurrence in the Spill Study Area

Appendix B. Vegetation Communities at Biological Monitoring Sites in Aliso Creek

Appendix C. Photographs of Biological Monitoring Sites

Appendix D. Wildlife Observed

## **1.0 INTRODUCTION**

On November 27, 2019, the North Coast Interceptor sewer force main operated by the City of Laguna Beach experienced a pipeline failure resulting in a sewage spill at two locations. The North Coast Interceptor force main connects the City of Laguna Beach (“City”) Bluebird pumping station with the SOCWA Coastal Treatment Plant (CTP) located adjacent to Aliso Creek approximately 1.2 miles upstream from the Pacific Ocean. The spill occurred at two locations identified as “Aliso” and “Bluebird” (Figure 1). The spill caused approximately 1.4 million gallons of sewage to be released to Aliso Creek and the Pacific Ocean.

This Biological Resources Damage Assessment Report has been prepared by Environmental & GIS Services, LLC (eGIS) to assess the potential impacts to biological resources of Aliso Creek and the Pacific Ocean resulting from the inadvertent release of the sewage from the force main. The study area for this report includes a section of Aliso Creek from 600 feet upstream of the spill and downstream to the mouth of Aliso Creek, a total length of approximately 4600 feet. The Aliso Creek spill impact study area includes the wetted area of the creek, the stream bank, and the associated riparian vegetation. Observations of potential impact also included the beach areas immediately adjacent to Aliso Creek and at the Bluebird storm drain outlet in Laguna Beach (Figure 1).

### **1.1 Regulations and Reporting Requirements**

SOCWA operates the North Coast Interceptor force main on behalf of the City under the Regional Water Quality Control Board (RWQCB) San Diego Region WDID 9SSO10653 for the City sewage collection system. The permit requires reporting of any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system. Overflows include:

- Overflows or releases of untreated or partially treated wastewater that reach waters of the United States;
- Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States; and
- Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly/federally-owned portion of a sanitary sewer system.

The RWQCB classifies overflows in the following categories

1. Category 1-All discharges of sewage resulting from a failure in the Discharger’s sanitary sewer system that:
  - a. Equal or exceed 1000 gallons, or
  - b. Result in a discharge to a drainage channel and/or surface water; or
  - c. Discharge to a storm drainpipe that was not fully captured and returned to the sanitary sewer system.
2. Category 2-All other discharges of sewage resulting from a failure in the Discharger’s sanitary sewer system.



**Figure 1.** North Coast Interceptor sewer line, Aliso Creek, and spill locations.



## **1.2 Spill Characterization**

The sewage spill experienced from November 27 to 29, 2019 is a RWQCB Category 1 discharge. SOCWA staff reported the sewage spill to the RWQCB San Diego Region (Event ID #863226) and the Orange County Health Department. The estimated total spill volume was 1.4 million gallons of sewage.

The spill occurred at two locations identified as “Aliso Creek” and “Bluebird” in Figure 1. Characteristics of the spills at these locations are as follows:

- Force Main Adjacent to Aliso Creek.
  - This was the initial and primary spill location, flowing approximately 70 feet to Aliso Creek, and then downstream approximately 4,000 feet in Aliso Creek to the Pacific Ocean.
  - The Aliso Creek release began at approximately 2:20 pm on 11/27/19. The spill discharge to Aliso Creek was relatively constant until the spill was halted approximately 12:15 pm on 11/29/19.
  - During dry weather Aliso Creek normally has a stream discharge of approximately 3-6 cfs, however at the time of the spill the Aliso Creek drainage was experiencing a significant rain event and peak discharges of 222, 2073, and 234 cfs, were experienced on 11/27, 11/28, and 11/29, respectively.
  - There are no significant additional storm water discharges to Aliso Creek between the spill location and the Pacific Ocean
- Bluebird Storm Drain.
  - The diversionary spill at the Laguna Beach Bluebird Pump Station was purposely released to enable repairs to be made to the force main at the Aliso Creek site.
  - The Bluebird diversionary spill entered the Bluebird storm drain and flowed approximately 700 feet to the Pacific Ocean.

## **2.0 BACKGROUND**

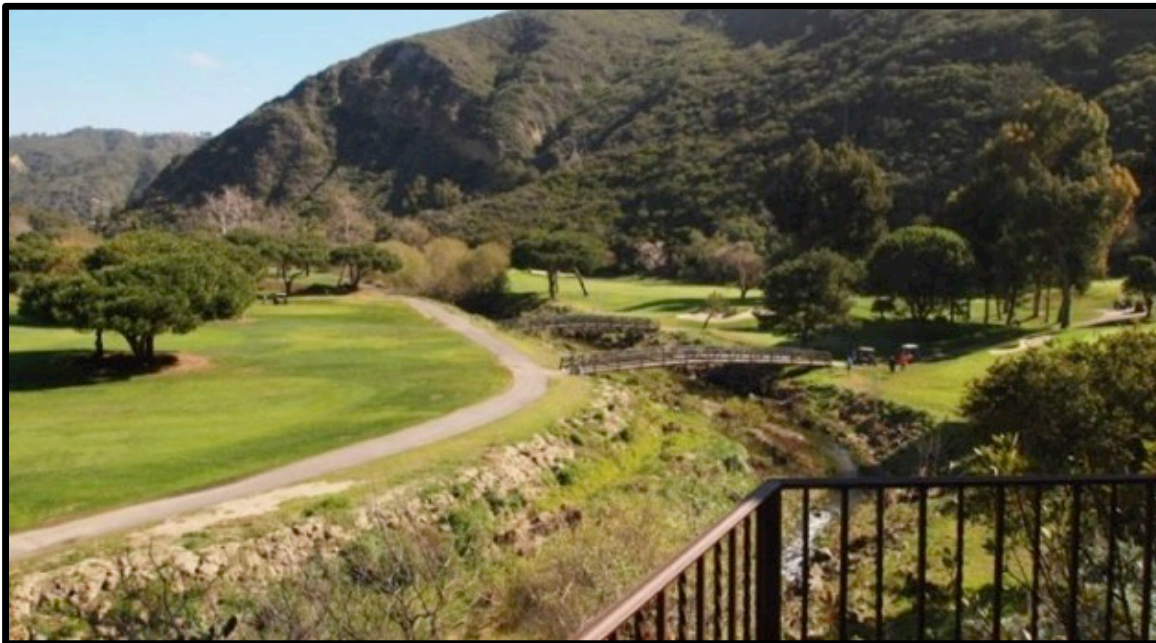
### **2.1 Aliso Creek Setting**

The Aliso Creek watershed is approximately 35 square miles in area and is located in southern Orange County (“County”). The watershed includes portions of the cities of Aliso Viejo, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, Mission Viejo, and County unincorporated areas including the 6 square mile Aliso and Wood Canyons Wilderness Park. The Aliso Creek watershed, like other watersheds in Orange County, has been significantly affected by urban development. Aliso Creek was once an intermittent stream before the region became heavily urbanized, but the stream now flows year-round as dry weather discharge has been augmented by significant increases in upstream urban runoff (USACOE 1999). In the spill study area, the creek is channelized and confined by riprap and urban development (Figure 1).

Aliso Creek is listed by the RWQCB as impaired for bacteria, bio-stimulatory nutrients, and toxic pollutants. The designated beneficial uses for Aliso Creek in the Water Quality Control Plan for the San Diego Basin include REC-2 (existing non-contact recreational use); REC-1 (potential body-contact recreational use); AGR (agricultural

supply); WARM (warm freshwater habitat); and WILD (wildlife habitat).<sup>1</sup> Water quality data collected by the County confirm that bacteria and total phosphorus concentrations routinely exceed water quality objectives along most of Aliso Creek's length. Sources of pollutant concentrations are most likely derived from such non-point sources as wildlife and pet waste, organic soil amendments, turf grass, organic debris, irrigation runoff, and seasonal bacterial propagation in street gutters and storm drain system.

The spill study area of the lower Aliso Creek drainage has topographic features, which, in combination with historic and existing land uses, influence the type and character of the study area: Aliso Canyon; Aliso Creek; the hillsides to the north and south of the canyon that rise steeply to form major ridgelines that define the lower Aliso Creek watershed; and rock outcrops and steep-walled rock faces that are found throughout the hillsides. Whereas the canyon floor and Aliso Creek have been heavily influenced by the historic and current uses, the steep hillsides and the rock outcrops and steep-walled rock faces remain relatively undisturbed within the study area. From its termination at the CTP the SOCWA force main is within an easement beneath the access road through the Laguna Beach Golf & Bungalow Village, LLC, (a golf course and resort, also known as "The Ranch") (Figure 2).



**Figure 2.** Typical view of Aliso Creek within The Ranch golf course.

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<sup>1</sup> The San Diego Region Water Quality Control Plan (Basin Plan) is available online at: [http://www.swrcb.ca.gov/sandiego/water\\_issues/programs/basin\\_plan/](http://www.swrcb.ca.gov/sandiego/water_issues/programs/basin_plan/)

## **2.2 Biological Resources**

Biological resources include the in-stream and riparian habitat of Aliso Creek, state- and federally-listed endangered or threatened species, species of special concern, wetlands, and other areas of critical biological concern. The California Department of Fish and Wildlife (CDFW), the US Fish and Wildlife Service (USFWS), the California Native Plant Society (CNPS) and the City of Laguna Beach provide regulations and management guidelines for the preservation of native vegetation and communities. These regulations provide protection of rare and special-status animals and plants. Special-status species are “listed” plant and animal groups with regulatory protection under either the federal Endangered Species Act or the endangered species programs of the USFWS and CDFW. The stream reach within the City is designated a Water Quality Environmental Sensitive Area (WQESA); City of Laguna Beach, 2003).

This biological resources damage assessment included review of the following information sources:

- CDFW Natural Diversity Data Base (CNDDDB) was reviewed for occurrences of rare, threatened, or endangered species within three miles of the spill study area. As described further below, the CNDDDB review resulted in three special-status animal species: coastal California gnatcatcher, least Bell’s vireo, and western pond turtle.
- Review of the biological information provided in the *Aliso and Wood Canyons Resource Management Plan*. Prepared by LSA Associates for the County of Orange, OC Parks. 2009.
- Review of the biological information provided in the *Initial Study and Environmental Checklist for Lift Station #2 Force Main Slipline, Laguna Beach, California*. Prepared by eGIS for South Coast Water District (2018).
- Review of biological information in studies and reports resulting from development plans for property of the Laguna Beach Golf & Bungalow Village, LLC, (a golf course and resort, also known as “The Ranch”). These documents included:
  - PRC Services Corporation. 2007. *Habitat Management Plan*. Aliso Creek Area Redevelopment Plan.
  - Glenn Lukos Associates, Inc. 2016. *Final Restoration Plan for Tree Trimming/Removal Activities in Aliso Creek – The Ranch at Laguna Beach*.
- Review of the biological information provided in *Aliso Creek Supplemental Biological Assessment – Aliso Creek Urban Runoff Recovery, Reuse, and Conservation Project*. Prepared by Environmental & GIS Service, LLC for the South Coast Water District (2009).
- Review of focused California coastal gnatcatcher and least Bell’s vireo protocol surveys conducted during May through July 2018 for California coastal gnatcatcher and least Bell’s vireo in the study area where there was suitable habitat for these species.<sup>2</sup>

## **2.3 Stream Discharge**

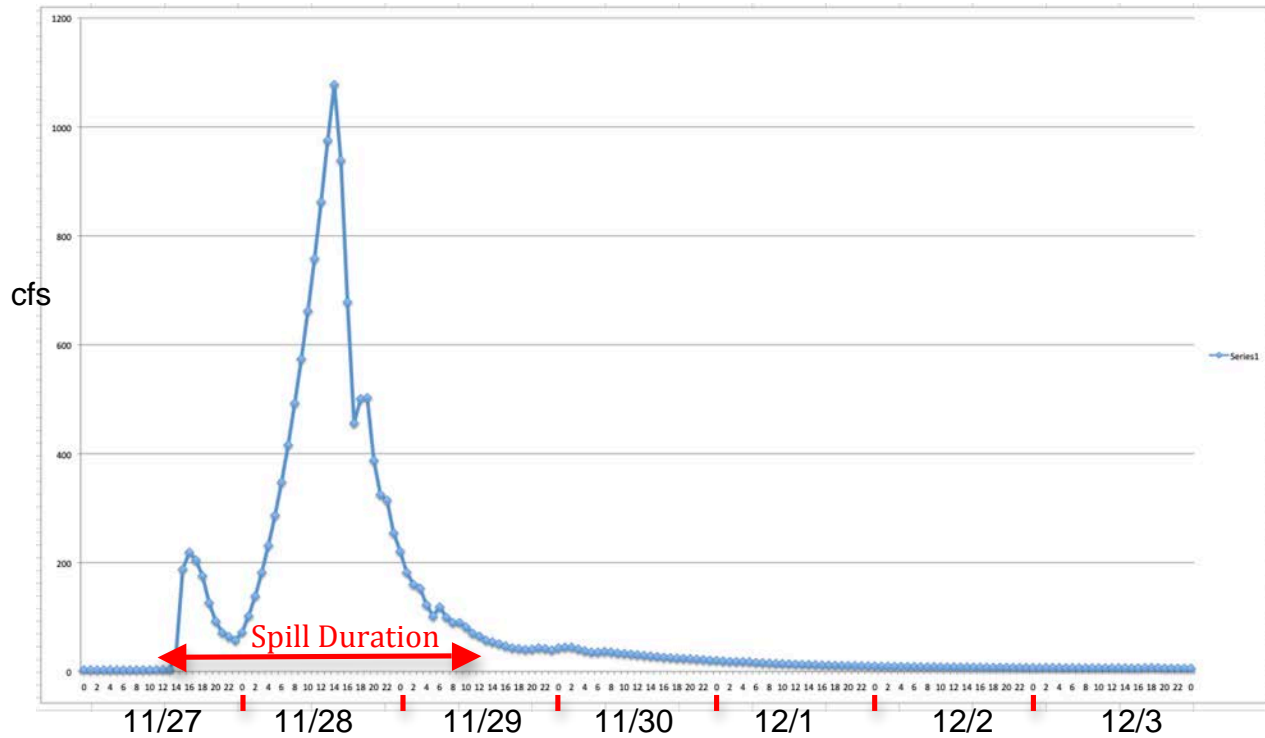
The spill occurred coincidentally during a significant rainfall event that greatly impacted the stream discharge of Aliso Creek for several days. A County operated stream gauge is located approximately 2500 feet upstream from the spill site, providing a nearby and accurate estimate of stream discharge at the spill location before, during, and after the spill event.<sup>3</sup> The Aliso Creek stream discharge reported by OC Public Works (2019) were used to determine the hourly stream discharge throughout the spill event (Figure 3 and Table 1).

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<sup>2</sup> Langdon, Spencer. 2018. Protocol Surveys for California Coastal Gnatcatcher for the SCWD LS-2 Slipline Project, Orange County CA. Prepared for submission to USFWS.

<sup>3</sup> Orange County Public Works. 2019. <http://hydstra.ocpublicworks.com/web.htm>





**Figure 3.** Aliso Creek average hourly stream discharge in cubic feet per second (cfs) before, during, and after the sewage release of November 27-29, 2019.

**Table 1.** Hourly stream discharge during and following the spill event.\*

Hour	27-Nov	28-Nov	29-Nov	30-Nov	1-Dec	2-Dec
0	2.9	71.8	220.3	42.8	20.2	9.9
1	2.8	101.8	181.8	44.5	19.3	9.6
2	2.8	138.3	159.9	44.4	18.5	9.3
3	2.8	181.9	153.0	41.3	18.3	9.3
4	2.8	231.4	122.3	37.9	18.2	9.1
5	2.8	286.6	101.3	35.2	17.6	9.1
6	2.8	347.4	118.4	35.4	16.5	8.8
7	2.8	416.1	99.5	36.7	15.8	8.8
8	2.8	492.5	89.7	35.6	15.2	8.5
9	2.8	573.8	89.8	33.6	14.5	8.7
10	2.9	662.1	81.2	33.0	14.3	8.4
11	3.1	757.9	70.0	31.8	13.8	8.3
12	3.2	862.0	64.9	30.5	13.4	8.4
13	3.3	975.0	57.5	29.3	13	8
14	33.2	1077.5	54.1	28.2	12.6	8.1
15	187.6	938.3	50.6	27.2	12.2	7.9
16	218.8	678.3	46.6	26.1	11.8	7.9
17	204.4	456.0	43.2	25.3	11.5	7.6
18	175.4	501.0	42.0	24.4	11.2	7.5
19	126.1	502.5	40.1	23.9	10.8	7.6
20	92.3	387.6	40.8	23.2	10.7	7.5
21	71.4	324.8	43.1	22.6	10.4	7.3
22	63.9	314.3	42.0	21.7	10.3	7.2
23	57.2	254.5	39.2	20.6	10.1	9.9

\*Spill event duration (color highlight)

## **2.4 Literature and Records Review**

A review of the available literature and records for the lower Aliso Creek area provided a potential list of special-status species known to occur in or near the spill area. The CDFW California Natural Diversity Data Base (CNDDDB) was searched for occurrences of rare, threatened, endangered, and/or sensitive animals, plants, and natural communities. The CNDDDB data search was conducted for the spill study area and surrounding area within three miles. The complete list of species resulting from the data search is provided in Appendix A along with an evaluation of the potential presence of these species in the habitats that occur in the study area.

The potential for a given species to be present was evaluated based on 1) the species range, 2) habitat requirements of the species versus the major plant community/habitat in the spill study area, 3) previous records or observations during field surveys. Special-status species that occur within three miles of the spill study area were evaluated to determine the potential for special-status species to occur and be impacted by the spill. The following discussion includes a review of the special-status species that are most likely to occur at the spill study area or in the downstream reaches of Aliso Creek.

### **2.4.1 Special-Status Plants**

Sixteen special-status plant species were recorded in CNDDDB within three miles of the spill study area, however none are considered likely to be found in the spill study area (Appendix A). Several of these species have been reported from the upland habitats surrounding the spill study area including: Big-leaved crownbeard, many-stemmed dudleya, Laguna Beach dudleya, and intermediate mariposa lily. The spill study area is Aliso Creek and associated riparian habitat and there are no areas in the spill study area that provide suitable habitat for any of the special-status plant species identified in the CNDDDB search.

### **2.4.2 Special-Status Animals**

Of the fourteen special-status species that were identified from the records search (Appendix A), only three listed species were considered to have a likely potential of occurrence within spill study area, as follows:

**Coastal California Gnatcatcher** (*Polioptila californica californica*). Federally Threatened and California State Species of Concern. This species generally prefers open sage scrub with California sagebrush (*Artemisia californica*) as a dominant or co-dominant species. Within The Ranch, no suitable habitat for coastal California gnatcatcher exists adjacent to the spill study area. No coastal California gnatcatcher were seen or heard during 2018 surveys conducted within the spill study area (SCWD 2018).

**Least Bell's Vireo** (*Vireo bellii pusillus*). Federally Threatened and California State Threatened. Suitable habitat for least Bell's vireo consists of perennial and intermittent streams with low, dense riparian scrub and riparian woodland habitats. A habitat assessment for the least Bell's vireo was conducted by PCR (2007) and by SCWD (2018). Those studies found that the downstream portion of Aliso Creek within the golf course and spill study area does not support dense riparian scrub habitat and is not suitable to support the least Bell's vireo.

**Southwestern Pond Turtle** (*Emys marmorata*) California Species of Special Concern. Habitat for southwestern pond turtle includes shallow water, herbaceous wetland, and riparian areas. Turtles are generally active from late May to October. In some areas of California, they may be active every month. Hibernation occurs underwater, often in the mud bottom of a stream pool. CNDDDB records indicate southwestern pond turtle may be found in Aliso Creek. Studies conducted in lower Aliso Creek reported one southwestern pond turtle basking near the CTB bridge but none were noted downstream in the spill study area (SCWD 2009).

### **2.4.3 Vegetation Communities**

Information on vegetation communities of the spill study area is available from several studies including the following:

- PRC Services Corporation. 2007. *Habitat Management Plan*. Aliso Creek Area Redevelopment Plan. Prepared for The Athens Group.
- South Coast Water District. 2009. *Aliso Creek Supplemental Biological Assessment – Aliso Creek Urban Runoff Recovery, Reuse, and Conservation Project*. Prepared by Environmental & GIS Services, LLC.
- Glenn Lukos Associates, Inc. 2016. *Final Restoration Plan for Tree Trimming/Removal Activities in Aliso Creek – The Ranch at Laguna Beach*.

Vegetation maps of the monitoring sites within the spill study area are provided in Appendix B (adopted from PRC 2009). Upstream of the spill study area Aliso Creek has relatively natural streambed conditions with relatively thick riparian habitat dominated by southern willow scrub and mule fat scrub. The downstream section of Aliso Creek within The Ranch has been channelized and riparian habitat along this section is comprised of a narrow band of southern willow scrub and mule fat scrub with some bank areas consisting of bare soil, riprap, or concrete channel. Beyond this narrow band of riparian habitat the vegetation is primarily ornamental (golf course) or urban development as part of the resort complex. The vegetation and habitat communities within the spill study area include the following (PRC 2007; communities after Holland, 1986):

PRiv - Perennial Rivers & Streams	MFSc - Mule Fat Scrub
SWSc - Southern Willow Scrub	MiSc - Mixed Scrub
Ds - Disturbed/Barren	Orn - Ornamental
GRT - Giant Reed Thicket	OW - Oak Woodland
HRip - Herbaceous Riparian	

### **2.4.4 Critical Habitat**

A beach sand berm at the downstream mouth of Aliso Creek usually forms a tidal estuary that has been designated by the USFWS as Critical Habitat for the tidewater goby (*Eucyclogobius newberryi*)<sup>4</sup>. The lagoon location corresponds to the +4000 foot spill monitoring site described in Section 3.0, below. The tidewater goby has been extirpated from the downstream tidewater estuary and has not been reported since the

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<sup>4</sup> U.S. Fish and Wildlife Service, 2019. Critical Habitat Mapper.

<https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77>  
Accessed December 1, 2019.

early 1970's. Based on review of the USFWS Online Critical Habitat Mapper the spill study area is not within any other state or federally Designated Critical Habitat.

### **3.0 IMPACT ASSESSMENT METHODS**

On November 27, 2019 at approximately 4:30 pm, an eGIS biologist (Dwight Mudry, Ph.D.) met on-site with SOCWA personnel to observe the spill in progress and outline plans for collection of data during and after the spill to support this Biological Resources Damage Assessment. After gathering details of the spill event and location, the eGIS biologist conducted a reconnaissance survey of the spill location, spill connection point at Aliso Creek, and downstream from the spill location to the ocean at Aliso Beach. The purpose of the reconnaissance survey was to locate the probable extent of the impact area and select stream sites for detailed study and monitoring.

On the first day of the spill (11/27/2019), SOCWA initiated collection of bacterial and water quality samples at four sites. After review of the SOCWA Standard Operating Procedure (SOP)<sup>5</sup> the evening of November 27, eGIS provided an outline of data needs, monitoring sites for control and impact areas, and monitoring procedures to be conducted by eGIS to supplement and expand SOCWA's own data collection efforts.

#### **3.1 Delineation of Potential Impact Area and Selection of Monitoring Sites**

During the reconnaissance survey and observations of the spill volume entering Aliso Creek it was determined that potential biological impacts of the spill would most likely extend from the spill location all the way to the ocean, and possibly to nearby beach areas. Two important factors were important for development of an appropriate monitoring plan. First, because the spill had not yet been contained and the cause of the force main failure was still to be determined, the repair method and duration of the spill were also unknown; therefore an extended period of monitoring would need to be implemented to capture and quantify the potential impacts during a potentially lengthy spill event. Second, the coincidental significant rain event began to impact stream discharge in Aliso Creek to flood levels within hours of the initial spill release. High stream discharge from storm runoff would contain increased levels of bacteria and other pollutants that normally accompany storm runoff rain events, particularly since Aliso Creek consists of runoff primarily from urban areas. In addition, the storm water runoff would dilute the sewage spill making it difficult to both determine the source of pollutants (either from the spill or from urban surface runoff) and the distance downstream that the spill could be detected. The monitoring plan focused on the following:

- Establishment of a "spill study area" for monitoring and analysis.
- Selection of monitoring sites to capture background stream conditions as well as spill impacts.
- Selection of monitoring sites that are representative of the varying stream and habitat conditions of the spill study area.
- Unifying the SOCWA monitoring sites with Biological Resources Damage Assessment monitoring sites to allow for comparable data analysis.
- Identifying a monitoring frequency that would document impact duration and recovery.

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<sup>5</sup> SOCWA. 2017. SOP- Biological Resources Damage Assessment for Treated and Untreated Wastewater Spills. Prepared for SOCWA by Environmental & GIS Services, LLC.

Ten monitoring sites were selected as follows (Figure 4):

**Control (Background) Monitoring Sites**

- -600 feet: Site located 600 feet upstream from the spill site as a control to establish background stream conditions.
- -200 feet: Site located 200 feet upstream from the spill site as a control to further establish background stream conditions.

**Spill site and Downstream Monitoring Sites**

- Spill site. The undiluted sewage spill was sampled at this location while the spill was still occurring. After the spill was halted the stream was monitored at this location.
- +200 feet: This is the first downstream monitoring site, likely representative of maximum sewage concentrations before thorough mixing with the entire stream flow.
- +600, +1000, +2000, +3000, +4000 feet : These five monitoring sites include the remaining length of Aliso Creek from the spill location to the ocean and help to identify the spatial extent of potential impacts.
- Ocean water quality monitoring: SOCWA performs regular water quality monitoring at three sites near the mouth of Aliso Creek at Aliso Beach. Sites at Bluebird Beach are monitored by Orange County Health Care Agency following storm events to identify the need for beach closures.<sup>6</sup>

**3.2 Monitoring Site Data Collection**

Monitoring site data collection followed the SOCWA SOP for Biological Resources Damage Assessment for Treated and Untreated Wastewater Spills and modified as needed for the Aliso Creek spill of November 27, 2019. The parameters listed in Table 2 were assessed and recorded, if applicable, for each of the monitoring sites.

**Table 2.** Summary of parameters assessed at biological monitoring sites

<b>Parameters Monitored</b>	
Gross estimation of pollutants	Stream Discharge
Visible pollutants	Cubic feet per second at County stream gauge
Unusual Odor	Channel
Organic matter	Bank to bank and wetted channel width
Surface film or foam	Average stream channel depth
Water clarity	Animals (15 minute observations at each site)
Algae growth/bloom	Insects
Other indications of residual spill	Fish
Vegetation	Reptiles, Amphibians
Estimated percent coverage of rooted plants	Birds
Vegetative class	Mammals
Vegetative type	Species observed; Activity observed
Species composition	Mortality
Discoloration or stress	Physical/chemical parameters (data collected by SOCWA staff)
Substrate	Turbidity
Estimated percent composition of stream substrate type (sand, gravel, cobble)	Temperature
Stream clarity	Salinity
Approximate depth of visibility	Human Development or Influence (concrete channels, riprap, etc.)

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<sup>6</sup> Orange County Health Care Agency. 2019. <https://ocbeachinfo.com/data/ Historical Bacteriological Water Quality Data – 2019 thru current>.





**Figure 4.** Biological assessment monitoring sites: two upstream control sites, the spill site, and six downstream impact survey sites.

## 4.0 SPILL MONITORING RESULTS

### 4.1 Summary of Monitoring Events

Monitoring to evaluate potential biological impacts was conducted at two upstream sites, the spill site, and six downstream sites as summarized in Table 3. These sites were monitored on six occasions starting on 11/27/2019, the first day of the spill, and ended on 12/19/2019 while water quality monitoring continued through 12/2/2019. Physical and habitat characteristics of each site are provided in Table 4, below.

**Table 3.** Summary of monitoring events

Date	Time	Activity
11/27/19	6:30 pm	Water Quality Samples (4): These samples were collected by SOCWA upstream and downstream at the spill site, in the lagoon at the mouth of Aliso Creek (+4000 site), and the ocean
	5:00 pm	Biological Reconnaissance, spill site to ocean
	9:45 pm	Issued preliminary monitoring strategy Water quality samples collected at beach sites
11/28	6:00 am	Flagged all monitoring sites
11/29	12:45 pm	Water Quality Samples collected at all stream monitoring sites
	8:00 am	Biological monitoring at all monitoring sites
11/30	11:35 am	Water Quality Samples collected at all stream monitoring sites
12/1	10:00 am	Biological monitoring at all monitoring sites
	12:05 pm	Water Quality Samples collected at all stream monitoring sites Water quality samples collected at beach sites
12/2	12:00 pm	Water Quality Samples collected at all stream monitoring sites
	12:40 pm	Water quality samples collected at beach sites
12/3	8:30 am	Biological monitoring at all monitoring sites
12/5	9:00 am	Biological monitoring at all monitoring sites
12/19	11:00 am	Biological monitoring at all monitoring sites

### 4.2 Characteristics of Biological Survey Sites

The spill study area of Aliso Creek is located within and downstream of The Ranch golf course. This section of the Aliso Creek is confined and channelized by riprap armoring to avoid bank erosion and damage to golf course infrastructure. Table 4 provides the characteristics of the biological monitoring sites and photographs of the biological survey sites are in Appendix C. The sites selected for biological monitoring are representative of the stream and riparian habitats in the spill study area.



**Table 4.** Vegetation and habitat characteristics of biological monitoring sites.

Site	Riparian Vegetation/Habitat (Source: Appendix B)	Description (Photographs are in Appendix C)
<b>Upstream Control Site -600</b>	SWSc - Southern Willow Scrub HRip - Herbaceous Riparian PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky with mud; Bank = riprap General: Upstream relatively wide and slow flowing pond section; downstream narrower with aquatic vegetation including thick areas of bulrush and cat-tail in the continually wetted areas. Riparian vegetation open with little overstory vegetation.
<b>Upstream Control Site -200</b>	SWSc - Southern Willow Scrub MFSc - Mule Fat Scrub PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky with mud; Bank = riprap General: Narrow stream with steep banks; bulrush and cat-tail are present in the continually wetted areas. Tall and thick riparian vegetation, shaded with thick overstory vegetation.
<b>Spill Site</b>	SWSc - Southern Willow Scrub GRT - Giant Reed Thicket PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky with mud; Bank = riprap General: Narrow stream with steep banks. Tall and thick riparian vegetation, partly shaded on east side with thick overstory vegetation. Bulrush and cat-tail are present in the continually wetted areas.
<b>Downstream Site +200</b>	SWSc - Southern Willow Scrub PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky with mud; Bank = riprap General: Wide stream flood area with steep banks. Thick in-stream bulrush and cat-tail are present in the continually wetted areas; open to sun with little riparian vegetation and no overstory vegetation.
<b>Downstream Site +600</b>	SWSc - Southern Willow Scrub PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky, gravel bottom; Bank = riprap General: Fast-flowing narrow stream with steep banks. Tall and thick riparian vegetation, shaded with thick overstory vegetation.
<b>Downstream Site +1000</b>	SWSc - Southern Willow Scrub Ds - Disturbed/Barren PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky, mud bottom; Bank = riprap General: Fast-flowing narrow stream with steep banks. Upstream is partly tall and thick riparian vegetation; downstream is open to sun with little riparian vegetation and no overstory vegetation. Thin band of bulrush and cat-tail in the continually wetted areas.
<b>Downstream Site +2000</b>	SWSc - Southern Willow Scrub HRip - Herbaceous Riparian Ds - Disturbed/Barren PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky, mud bottom; CTP outfall concrete structure exposed on stream bottom; Bank = riprap General: Fast-flowing narrow stream with steep banks. Short bank section with tall and thick riparian vegetation; remainder open to sun with little riparian vegetation and no overstory vegetation.
<b>Downstream Site +3000</b>	PRiv - Perennial Rivers & Streams	Substrate: Bottom = rocky, mud bottom; CTP outfall concrete structure exposed on stream bottom; Bank = riprap General: Slow-flowing wide stream with steep banks. Short section with tall and thick riparian overstory vegetation; remainder open to sun with little riparian vegetation and no overstory vegetation. No in-stream vegetation
<b>Downstream Site +4000</b>	PRiv - Perennial Rivers & Streams (No riparian vegetation)	Substrate: Bottom = sand; Bank = upper section is rocky, lower section is sand. General: Lagoon forms behind sand berm with low stream discharge; flows freely during high flow. No riparian vegetation and no overstory vegetation. No in-stream vegetation

### **4.3 Pollution Indicators**

#### **4.3.1 Visible Pollutants**

As illustrated in Figure 1, above, Aliso Creek experienced very high stream discharge through the entire spill event resulting in high turbidity at all upstream and downstream monitoring sites. During most of the spill event the sewage was of a color similar to the turbid stream water and quickly blended with the stream. There was no visible evidence of the presence of sewage at any of the monitoring sites and all of the downstream sites appeared similar to the two upstream (control) sites.

On 11/29/2019, when the sewage discharge at Aliso was being reduced by release of sewage from the Bluebird pump station, the sewage spill at Aliso became markedly darker, almost black. The darker sewage release lasted for about one hour before the spill ended. Observation of the stream while the darker sewage was being released indicated that the spilled sewage water could be detected in the stream by the darker color of water close to the west side of the creek for 40 to 50 feet downstream of the spill site before it blended with the stream water and was no longer visible. The stream edge and vegetation were subsequently examined at all monitoring sites and there was no evidence of visible pollution at any location.

#### **4.3.2 Unusual Odor**

The odor of sewage was strongest at the spill location throughout the spill event until the spill ended on 11/29/2019. When the spill location was closely examined on 12/3/2019, the heavy rain and high stream discharges had removed all sewage and there was no detectable odor at the spill site or any other location.

At downstream sites +200 and +600 feet, sewage odor was detectable during the spill but not thereafter. The remaining downstream sites had intermittent odor when wind was blowing from the upstream spill site.

#### **4.3.3 Organic Matter**

The stream bank substrate, water edge and riparian vegetation were examined for the presence of organic matter. The riprap at the spill site was closely examined on 12/3/2019, three days after the spill was terminated. Filaments of accumulated dry organic matter were noted on the riprap leading down to the stream edge (Figure 5). When examined on 12/3/2019, there was no odor associated with the organic material. Although a large volume of organic matter was undoubtedly released with the sewage spill, the stream discharge was so high throughout the spill that organic matter did not collect and was not detected at any downstream site.



**Figure 5.** Organic matter on riprap at the spill site.

#### **4.3.4 Surface Film or Foam**

A surface film or foam was not observed at any location during the spill. On 12/5/2019, the sand berm at the mouth of Aliso Creek (Site +4000) had begun to form in response

to the lowering stream discharges. Surface foam was observed at that time in the still water adjacent to the sand berm. Surface foam at this downstream location is a common occurrence and has been observed by the eGIS biologist at this location on many occasions unrelated to a sewage spill.

#### 4.3.5 Algae Growth/Bloom

An algae bloom was observed at an upstream control site on 12/3/2019 (Site -600; Figure 6). Stream discharge was low at about 6.5 cfs and algae were observed to be accumulating in the backwater areas of the stream at Site -600. No other sites exhibited algae growth/bloom and the algae bloom observed at upstream Site -600 is unrelated to the spill event.



**Figure 6.** Algae bloom at upstream site -600.

#### 4.3.6 Water Clarity

As noted above, Aliso Creek experienced very high stream discharge through the entire spill event resulting in high turbidity at all sites including the upstream control sites. Rainfall and steam discharge declined after the spill event and some variation in water clarity was noted during the stream monitoring conducted for evaluation of potential impacts to biological resources. Water clarity appeared to improve between the surveys on 11/29 to 12/3/2019 when stream discharge was approximately 6.5 cfs, but visibility was markedly lower at all sites on 12/5/2019 (Table 5) when stream discharge had risen to approximately 24 cfs (see Table 1). There was no apparent difference in water clarity between the upstream control sites and the downstream impacted sites.

**Table 5.** Water clarity at biological monitoring sites as indicated by approximate visible depth.

Date	Monitoring Dates (all 2019)				
	11/29	12/1	12/3	12/5	12/19
Discharge (cfs) (cfs)	70	14	6.5	24	3.8
Site	Visibility (approx depth)				
	feet	feet	feet	inches	feet
-600	2	2	2	4-6"	3-4
-200	2	2	2	4-6"	3+
Spill	1	2	2	4-6"	3+
+200	1	2	2	4-6"	4
+600	1	2	2	4-6"	3-4
+1000	1	3	3	4-6"	4
+2000	2	3	3	4-6"	3+
+3000	2	3	2	4-6"	3-4
+4000	2	2	2	4-6"	3-4



#### **4.3.7 Water Quality**

##### **Total Suspended Solids**

Total suspended solids (TSS; mg/L) was used to determine the solids loading from the spill and background sources. TSS data collected with the water quality monitoring program indicated little difference between control and spill impacted sites during all sampling events (Table 6). The contribution of the spill to TSS of downstream waters was undetectable with the high background (upstream) TSS levels of Aliso Creek during the rain and subsequent high stream discharge that reached flood levels. In six samples collected from 11/27/2019 to 12/2/2019 there was no significant difference in TSS concentrations between upstream and downstream sites.

##### **Total Coliforms**

This group of bacteria are used to determine the sanitary conditions of the water body. The group of bacteria includes species that also inhabit soil and other environmental niches. Total coliform bacteria are included in public health monitoring requirements. The receiving water limit for single sample maximum thresholds is 10,000 colony forming units (cfu) per 100ml.

Total coliform data collected on 11/27 from upstream and downstream sites indicated a brief but marked increase in coliform counts downstream of the spill site (Table 6). The rainfall event had begun within the Aliso Creek drainage, however stream flow had only increased to approximately 160 cfs when the 11/27 samples were collected.

Background (upstream) total coliform counts were 35,000 CFU/100 ml and downstream counts were 3 to 4 times higher as a result of the spill (Table 6). Downstream total coliform counts remained marginally higher than upstream on 11/28 when stream discharge was greatest. Following the spill event, in four samples collected from 11/29 to 12/2 there was no significant difference in total coliform counts between upstream (control) and downstream (impact) sites.

Bacteriological samples were collected at two ocean sampling areas: three sites at Aliso Beach and one at Bluebird Beach (Table 8). At Aliso Beach, samples were collected at the mouth of Aliso Creek (Site S9), and 1000 feet south and north of Aliso Creek (Sites S8 and S10, respectively). Total coliform at all three of the Aliso Beach sites were relatively low prior to the spill, peaked on 11/30, and returned to normal levels by 12/3. The high total coliform counts on 11/30 can be attributed to sources upstream from the spill location as noted in at sites -600 and -200 in Table 6, and are probably not related to the spill event.

**Table 6.** Water quality indicators in samples collected at biological monitoring sites.

Site	Monitoring Dates					
	11/27	11/28	11/29	11/30	12/1	12/2
<b>Total Suspended Solids (mg/L)</b>						
-600		1065	56	48	31	31
-200	196	1051	64	55	22	25
Spill Site		554**	52	91	23	31
+200	222	938	52	37	27	25
+600		1051	60	34	22	25
+1000		1046	64	68	22	23
+2000		999	56	32	27	26
+3000		1094	56	36	26	20
+4000	212		48	33	22	58
<b>Total Coliform (CFU/100 ml)*</b>						
-600		2,000	15,000	178,500	20,000	800
-200	35,000	10,000	32,000	125,900	4,000	1,700
Spill Site		>400,000**	19,600	167,000	20,000	600
+200	154,200	15,000	17,000	166,400	4,000	2,400
+600		12,000	37,800	161,600	4,000	1,100
+1000		26,000	22,000	307,600	12,000	900
+2000		14,000	12,600	113,700	8,000	1,100
+3000		10,000	19,400	224,700	16,000	700
+4000	118,800			141,360	4,000	2,200

\* "CFU" = Colony forming units

\*\* Spill site sample on 11/28 represents an undiluted sample of sewage spill discharge

**Table 7.** Total Coliform (CFU/100 ml) in samples collected at beach sites.

<b>Aliso Beach</b>								
Site	Monitoring Dates							
	11/4	11/13	11/18	11/26	11/30	12/1	12/3	12/10
S8*	10	40	10	10	110	20	10	10
S9*	10	90	10	10	240	60	30	40
S10*	10	10	10	10	180	130	10	10
<b>Bluebird Beach</b>								
Site	Monitoring Dates							
	11/5	11/12	11/19	11/26			12/3	12/12
Bluebird	9	91	9	330			120	360

\*Aliso Beach sites: S8= 1000 feet south of Aliso Creek; S9= at Aliso Creek; S10= 1000 feet north of Aliso Creek

#### 4.3.8 Vegetation Impacts

As may be seen in the photographs of the spill study area (Appendix C), Aliso Creek and associated riparian habitat varies considerably within the spill study area. At some locations the stream is narrow and confined with heavy riparian vegetation and relatively rapid stream flow. Other locations are quite wide, deep, slow, and may be without any vegetation at all. The general characteristics of vegetation at the spill monitoring sites are described in Table 4, above.

During most of the spill event, stream discharge was exceptionally high causing the stream level to be 5 to 8 feet above the normal low-flow condition. The high water mark during this flood event was easily determined by the accumulation of branches, grasses, and similar debris on trees and other woody riparian vegetation that had been submerged during the period of high stream discharge. As the stream discharge decreased eGIS biologists examined the riparian vegetation from the flood level down to normal stream levels for discoloration, stress, odor, and presence of organic matter. Close examination of the riparian vegetation impacted by the flood conditions yielded no evidence of the spill event at the high water mark when the spill was in progress. Similarly, when the stream discharge was reduced to more normal levels the examination of in-stream bulrush and cat-tail vegetation gave no indication of discoloration, stress, odor, or presence of organic matter.

#### 4.3.9 Wildlife Presence and Behavior

Observations of wildlife were made at each of the monitoring/monitoring sites. Each site was monitored for approximately 15 minutes during each monitoring event. Wildlife was characterized mostly by bird species that are representative of the riparian and adjacent upland habitats (Table 8).

The bird species and other wildlife observed within the spill study area varied within the different habitats. Most of the species observed were relatively common and characteristic of the surrounding upland habitats as well as the narrow vegetated riparian habitats, however several species such as American coot, mallard, common yellowthroat were closely associated with stream and adjacent riparian habitats. Table 8, below, provides a summary of the wildlife species observed at the biological monitoring sites.

Incidental observations of other wildlife included the following: Common Carp – *Cyprinus carpio*; Western fence lizard – *Sceloporus occidentalis*; California ground squirrel – *Spermophilus beecheyi*; Mule Deer - *Odocoileus hemionus*

Use of stream habitat during the spill event (11/27 and 11/28) by birds was greatly influenced by the intense rainfall and associated flood conditions (Figure 3). During reconnaissance biological surveys on 11/27 and 11/28 when rainfall was heavy, no birds or other animals were noted in incidental observations at any of the monitoring sites. Biologically each site is unique in stream characteristics, in-stream vegetation, riparian habitat, sun exposure, and many other factors and, therefore, are not strictly comparable. When the floodwaters began to subside, biological monitoring on 11/29 and the following days indicated bird use returning to normal. Fast flowing, narrow upstream and downstream sites with riparian vegetation were dominated by upland

species (phoebes, towhees, and warblers), downstream slower flowing areas had water birds (coots, mallards), and the downstream lagoon had many coastal marine species (gulls, sandpipers) (Table 8; Appendix D). Bird activity and behavior appeared normal and there was no indication of mortality or other impact related to the spill event. No sensitive or special-status animal species were observed within the spill study area.

**Table 8.** Wildlife species observed at the biological monitoring sites.

Species	Site	-600	-200	Spill	+200	+600	+1000	+2000	+3000	+4000
<b>Birds</b>										
Western Gull										X
California Gull										X
Heerman's Gull										X
Ring Bill Gull										X
Unknown gulls										X
Royal Tern										X
Brown Pelican										X
Willet										X
Great Blue Heron										X
Snowy Egret									X*	
Spotted sandpiper*								X	X	X
American Coot		X					X		X	X
Mallard									X	X
Gadwall									X	
Black Phoebe		X	X		X	X	X	X	X	X
Say's Phoebe			X	X		X	X	X	X	
California Towhee			X			X	X			
Yellow Rumped Warbler		X	X			X				
Orange Crowned Warbler				X		X	X			
Common Yellowthroat		X					X			
Song Sparrow									X	
Belted Kingfisher			X						X	
American Kestrel							X			
Osprey								X		
American Crow							X	X	X	X
Northern Mockingbird									X	X
Allen's Hummingbird							X		X	
Anna's Hummingbird							X			
Western Kingbird			X	X						
Nuttal's Woodpecker			X	X		X	X	X		
Northern Flicker		X			X	X	X	X		
House wren						X	X	X		
Bushtit									X	
Hutton's Vireo					X					
Raven			X				X	X	X	X
Unidentified Hawk									X	
Rock Pigeon										X
<b>Other Wildlife</b>										
Butterfly				X					X	
Carp*							X*			
Western Fence Lizard							X			
Pacific Tree frog (vocal)		X	X		X	X		X		
Raccoon							X			
Deer							X	X		
Ground Squirrel			X	X						X

\*Incidental observation on 12/10/2019, not during a regular monitoring event.

## **5.0 SUMMARY AND DISCUSSION OF IMPACTS**

On November 27, 2019, the North Coast Interceptor sewer force main operated by the City of Laguna Beach experienced a pipeline failure resulting in a sewage spill at two locations. The spill caused approximately 600,000 gallons of sewage to be released to Aliso Creek and 800,000 gallons to the Bluebird storm drain. In the spill study area, Aliso Creek is channelized and confined by riprap and urban development. The spill occurred coincidentally during a significant rainfall event that greatly impacted the stream discharge of Aliso Creek for several days.

During the reconnaissance survey and observations of the spill volume entering Aliso Creek it was determined that potential biological impacts of the spill would most likely extend from the spill location all the way to the ocean, and possibly to nearby beach areas. Nine monitoring sites were selected on Aliso Creek as follows: two upstream “control” sites, the spill site, and six downstream sites. In addition, water quality samples were collected from nearby surf zone sites at Aliso Beach and Bluebird Beach. Monitoring procedures followed a previously prepared SOCWA standard operating procedure (SOP) for treated and untreated wastewater spills.

Monitoring of potential spill impacts to biological resources was conducted on five days during and following the spill event from 11/29 to 12/19. SOCWA collected water quality samples on the day of the spill and five days following the spill event.

Observations of pollution indicators included the following:

- **Visible Pollutants.** Aliso Creek experienced very high stream discharge through the entire spill event resulting in high turbidity at all upstream and downstream monitoring sites. During most of the spill event the sewage was of a color similar to the turbid stream water and quickly blended with the stream. There was no visible evidence of the presence of sewage at any of the monitoring sites and all of the downstream sites appeared similar to the two upstream (control) sites.
- **Unusual Odor.** The odor of sewage was strongest at the spill location throughout the spill event until the spill ended on 11/29. When the spill location was closely examined on 12/3, the heavy rain and high stream discharges had removed all sewage and there was no detectable odor at the spill site or any other location. At downstream sites +200 and +600 feet, sewage odor was detectable during the spill but not thereafter. The remaining downstream sites had intermittent odor when wind was blowing from the upstream spill site.
- **Organic Matter.** The riprap at the spill site was closely examined on 12/3, three days after the spill was terminated. Filaments of accumulated dry organic matter were noted on the riprap leading down to the stream edge. Although a large volume of organic matter was undoubtedly released with the sewage spill, the stream discharges were so high throughout the spill that organic matter did not collect and was not detected at any downstream site.
- **Surface Film or Foam.** A surface film or foam was not observed at any location during the spill. On 12/5, the sand berm at the mouth of Aliso Creek (Site +4000) had begun to form in response to the lowering stream discharges. Surface foam was observed at that time in the still water adjacent to the sand berm. Surface foam at this downstream location is a common occurrence and has been



observed by the eGIS biologist at this location on many occasions unrelated to a sewage spill.

- **Algae Growth/Bloom.** An algae bloom was observed at an upstream control site on 12/3 (Site -600). Stream discharge was low at about 6.5 cfs and algae were observed to be accumulating in the backwater areas of the stream at Site -600. No other sites exhibited algae growth/bloom and the algae bloom observed at upstream Site -600 is unrelated to the spill event.
- **Water Clarity.** Aliso Creek experienced very high stream discharge through the entire spill event resulting in high turbidity at all sites including the upstream control sites. There was no apparent difference in water clarity between the upstream control sites and the downstream impacted sites.
- **Total Suspended Solids (TSS).** TSS data collected with the water quality monitoring program indicated little difference between control and spill impacted sites during all sampling events. The contribution of the spill to TSS of downstream waters was undetectable with the high background (upstream) TSS levels of Aliso Creek during the rain and subsequent high stream discharge that reached flood levels.
- **Total Coliform.** Total coliform data collected on 11/27 from upstream and downstream sites indicated a brief but marked increase in coliform counts downstream of the spill site. Following the spill event, in five samples collected from 11/29 to 12/30 there was no significant difference in total coliform counts between upstream and downstream sites.
- **Vegetation Impacts.** Aliso Creek and associated riparian habitat varies considerably within the spill study area. At some locations the stream is narrow and confined with heavy riparian vegetation and relatively rapid stream flow. Other locations are quite wide, deep, slow, and may be without any vegetation at all. During most of the spill event, stream discharge was exceptionally high causing the stream level to be 5 to 8 feet above the normal low-flow condition. As the stream discharge decreased eGIS biologists examined the riparian vegetation from the flood level down to normal stream levels for discoloration, stress, odor, and presence of organic matter. Close examination of the riparian vegetation impacted by the flood conditions yielded no evidence of the spill event at the high water mark. Similarly, when the stream discharge was reduced to more normal levels the examination of in-stream bulrush and cattail vegetation gave no indication of discoloration, stress, odor, or presence of organic matter.
- **Wildlife Presence and Behavior.** Use of stream habitat during the spill event (11/27 and 11/28) by birds was greatly influenced by the intense rainfall and associated flood conditions. During reconnaissance biological surveys on 11/27 and 11/28, no birds or other animals were noted in incidental observations at any of the monitoring sites. When the floodwaters began to subside, biological monitoring on 11/29 and the following days indicated bird use returning to normal. Fast flowing, narrow upstream and downstream sites were dominated by upland species (phoebes, towhees, and warblers), downstream slower flowing areas had water birds (coots, mallards), and the downstream lagoon had coastal marine species (gulls, sandpipers). Bird activity and behavior appeared normal and there was no indication of mortality or other impact related to the spill event.

No sensitive or special-status animal species were observed within the spill study area.

In summary, the Aliso Creek spill impact area was sampled and surveyed during and following the spill event. The spill event was accompanied by significant rainfall that increased stream discharge to flood levels. The high stream discharge included urban runoff with high levels of pollutants and suspended materials such that there were no significant differences in upstream control sites versus downstream spill study area sites for pollution indicator parameters that were measured or observed. Biological surveys at two upstream sites and eight downstream sites during and following the spill event indicated that impacts to biological resources, if any, were temporary. During several surveys conducted at all of the monitoring sites following the spill, no evidence of the spill remained and no long-term impacts would be expected. No additional monitoring is recommended.

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## Appendices

- Appendix A. Likelihood of Special-Status Species Occurrence in the Spill Study Area
- Appendix B. Vegetation Communities at Biological Monitoring Sites in Aliso Creek
- Appendix C. Photographs of Biological Monitoring Sites
- Appendix D. Wildlife Observed

**Appendix A. Likelihood of Special-Status Species Occurrence in the Spill Study Area**

CNDDDB Special-Status Species within 3 miles		Status <sup>1</sup>		Likelihood of Occurrence	Species Information and Habitat Availability
Common Name	Scientific Name	Federal	State		
<b>PLANTS</b>					
Aphanisma	<i>Aphanisma blitoides</i>	None	1B.2	Absent	Closest CNDDDB record is 1 mile northwest (1932), accuracy unknown. Within grasses on beach bluff. There is no suitable habitat for this species in the spill study area.
Laguna Beach dudleya	<i>Dudleya stolonifera</i>	T	T/1B.1	Absent	CNDDDB records within a few hundred feet north and south of the spill study area up on the cliff faces in shaded areas. It is a perennial herb that is native to California and is endemic to California alone. There is no suitable habitat for this species in the spill study area.
Nuttall's scrub oak	<i>Quercus dumosa</i>	None	1B.1	Unlikely	Closest CNDDDB record is 0.8 mile northeast (1982). It is a shrub that is native to California and to Baja California. General habitat is Coastal chaparral with a relatively open canopy cover is the preferred habitat in flat terrain; on north-facing slopes this shrub may grow in dense stands. There is no suitable habitat for this species in the spill study area.
Intermediate mariposa lily	<i>Calochortus weedii</i> var. <i>intermedius</i>	None	1B.2	Unlikely	Closest CNDDDB record is within one-half mile of the spill study area (2010) located on hillsides. General habitat is dry grasslands and semi-deserts. There is no suitable habitat for this species in the spill study area.
Many-stemmed dudleya	<i>Dudleya multicaulis</i>	None	1B.2	Unlikely	Spill study area is within CNDDDB Polygon. Location non-specific. General habitat is openings in Diegan Sage Scrub and Valley Grasslands. There is no suitable habitat for this species in the spill study area.
Mesa horkelia	<i>Horkelia cuneate</i> var. <i>puberula</i>	None	1B.1	Unlikely	Closest CNDDDB record is 3 miles northwest (1954). Found in dry, sandy, coastal chaparral. There is no suitable habitat for this species in the spill study area.
Davidson's saltscale	<i>Atriplex serenana</i> var. <i>davidonii</i>	None	1B.2	Unlikely	Closest CNDDDB record is 3 miles northwest. Occurrence date unknown. Found in coastal bluff scrub. There is no suitable habitat for this species in the spill study area.
Prostrate vernal pool navarretia	<i>Navarretia prostrata</i>	None	1B.1	Absent	Closest CNDDDB record is 3 miles northwest (1890); vernal pool habitat There is no suitable habitat for this species in the spill study area.
Summer holly	<i>Comarostaphylis diversifolia</i> ssp. <i>diversifolia</i>	None	1B.2	Unlikely	Closest CNDDDB record is 0.25 mile southeast (1984) exact location unknown. It is a shrub that is native to California and to Baja California. General habitat is Southern Mixed Chaparral, usually on mesic north-facing slopes. There is no suitable habitat for this species in the spill study area.
Cliff spurge	<i>Euphorbia misera</i>	None	2B.2	Unlikely	Closest CNDDDB record is 0.25 miles southeast (1954). It is a shrub that is native to California and to Baja California. General Habitat requires Maritime Sage Scrub with a high incidence of cactus is typical of the preferred habitat for Cliff Spurge. There is no suitable habitat for this species in the spill study area.
Coulter's saltbush	<i>Atriplex coulteri</i>	None	1B.2	Absent	Closest CNDDDB record is 1.8 miles to the northwest (1918). Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grassland. There is no suitable habitat for this species in the spill study area.
South coast salscale	<i>Atriplex pacifica</i>	None	1B.2	Absent	Closest CNDDDB record is 1.8 miles to the northwest (1931). Found on coastal bluffs. There is no suitable habitat for this species in the spill study area.
Thread-leaved brodiaea	<i>Brodiaea filifolia</i>	T	E/1B	Absent	Closest CNDDDB record is 2.25 miles northeast (2010). Found on gentle to moderately steep south -facing slope on calleguas clay loam soil in both disturbed native grassland and annual grassland. There is no suitable habitat for this species in the spill study area.
Orcutt's pincushion	<i>Chaenactis glabriuscula</i> var. <i>Orcuttiana</i>	None	1B.1	Absent	Coastal bluff scrub, coastal dunes. CNDDDB indicates it possibly is extirpated (records from 1924). There is no suitable habitat for this species in the spill study area.
Allen's pentachaeta	<i>Pentachaeta aurea</i> ssp. <i>allenii</i>	None	1B.1	Unlikely	Closest CNDDDB record is 1.6 miles southeast (2004) On ridges and open slopes. Chaparral and coastal sage scrub. There is no suitable habitat for this species in the spill study area.

CNDDDB Special-Status Species within 3 miles		Status <sup>1</sup>		Likelihood of Occurrence	Species Information and Habitat Availability
Common Name	Scientific Name	Federal	State		
Big-leaved crownbeard	<i>Verbesina dissita</i>	T	T/1B.1	Unlikely	CNDDDB records within a few hundred feet up along ridge tops. It is a perennial shrub that is native to California and to Baja California. General Habitat is north-facing slopes of rugged coastal hillsides and steep canyons in dense southern maritime chaparral. There is no suitable habitat for this species in the spill study area.

<b>FISH</b>					
CNDDDB Special-Status Species within 3 miles		Status <sup>1</sup>		Likelihood of Occurrence	Species Information and Habitat Availability
Common Name	Scientific Name	Federal	State		
Tidewater Goby	<i>Eucyclogobius newberryi</i>	E	SC	Unlikely	CNDDDB polygon for entire Aliso Creek. The tidewater goby is a small native goby found along the Pacific

*Biological Resources Damage Assessment - SOCWA Spill of 11/27/19 to 11/29/19*

AMPHIBIANS & REPTILES					coast of California from the Smith River, Del Norte County, south to Agua Hedionda Lagoon, San Diego County. Last reported in Aliso Creek in 1970's.
Western spadefoot toad	<i>Spea hammondi</i>	None	SC	Unlikely	Closest CNDDDB record is 2.4 miles southeast (2005) This species lives in a wide range of habitats; lowlands to foothills, grasslands, open chaparral, pine-oak woodlands. It prefers shortgrass plains, sandy or gravelly soil (e.g., alkali flats, washes, alluvial fans). It is fossorial and breeds in temporary rain pools and slow-moving streams. No records within Aliso Creek.
Coast horned lizard	<i>Phrynosoma blainvillii</i>	None	SC	Unlikely	Closest CNDDDB record is 0.67 mile northeast (2001). This species occurs in a variety of habitats, including scrubland, grassland, coniferous woods, and broadleaf woodlands; typically, it is found in areas with sandy soil and scattered shrub near ant colonies. This species was not detected during the spill study area biological surveys.
Orange-throated whiptail	<i>Aspidoscelis hyperythra</i>	None	WL	Unlikely	Closest CNDDDB record is 1.14 miles SE (1990). This species occurs in a variety of habitats, including scrubland, grassland, coniferous woods, and broadleaf woodlands. This species was not detected during the spill study area biological surveys.
Coastal whiptail	<i>Aspidoscelis tigris stejnegeri</i>	None	SC	Unlikely	Closest CNDDDB record is 0.58 mile northeast (2001). Found in deserts & semiarid areas with sparse vegetation and open areas. Also found in woodland & riparian areas. This species was not detected during the spill study area biological surveys.
Southwestern pond turtle	<i>Emys marmorata</i>	None	SC	Likely	The spill study area is directly adjacent to Aliso Creek where CNDDDB records indicate species may be present. This species habitat(s): Shallow water, herbaceous wetland, and riparian areas; Reported from Aliso Creek (CNDDDB 2019). This species was not detected during the spill study area biological surveys.
<b>BIRDS</b>					
Cooper's hawk	<i>Accipiter cooperii</i>	None	WL	Likely	Closest CNDDDB record 2.3 miles northwest (1972) Coopers Hawk has been reported from the general spill study area. This species was not detected during the spill study area biological surveys.
Coastal California gnatcatcher	<i>Poliophtila californica californica</i>	T	SC	Unlikely	Closest CNDDDB record 0.42 miles northwest (2004). This species generally prefers open sage scrub with California sagebrush ( <i>Artemisia californica</i> ) as a dominant or co-dominant species. No suitable habitat in the spill study area.
Coastal cactus wren	<i>Campylorhynchus brunneicapillus ssp. sandiegensis</i>	None	SC	Unlikely	The Cactus Wren is a permanent resident of arid and semi-arid desert regions of the southwestern United States This species was not detected during the spill study area biological surveys.
Least Bell's vireo	<i>Vireo bellii pusillus</i>	E	E	Likely	Closest CNDDDB record is 0.8 mile to the north within the Park (2004) Habitat for this species consists of perennial and intermittent streams with low, dense riparian scrub and riparian woodland habitats This species was not detected during the spill study area biological surveys.
Southern California rufous-crowned sparrow	<i>Aimophila ruficeps canescens</i>	None	WL	Unlikely	Closest CNDDDB record is 1 mile to the north within the Park (2001). This species prefers open shrubby habitat on rocky, xeric slopes. There is no suitable habitat for this species in the spill study area.
Tricolored blackbird	<i>Agelaius tricolor</i>	None	CE/SC	Unlikely	Closest CNDDDB record 2 miles NW (1936). Found in freshwater marshes. There is no suitable habitat for this species in the spill study area.
White-tailed kite	<i>Elanus leucurus</i>	None	FP	Unlikely	Closest CNDDDB record is 2.25 mile southeast (2008). Utilizes a variety of habitats including but not limited to open groves, river valleys, marshes, and grasslands. This species was not detected during the spill study area biological surveys.
<b>MAMMALS</b>					
Western mastiff bat	<i>Eumops perotis californicus</i>	None	SC	Unlikely	Closest CNDDDB record.2.5 Mi NE (date unknown). Many open, semi-arid to arid habitats, including conifer & deciduous woodlands, coastal scrub, grasslands, chaparral etc. The sewage spill would not have a significant effect on roosting or foraging.

<sup>1</sup>Status Designations

Plants - California Native Plant Society (CNPS) designations

- 1B Rare, threatened, or endangered in CA and elsewhere.
- 2B Rare, threatened, or endangered in CA, but more common elsewhere.
- .1 Seriously endangered in CA.
- .2 Fairly endangered in CA.
- .3 Not very endangered in CA.

Federal and State Designations

- E Endangered
- T Threatened
- SC Species of Concern
- FP Fully Protected
- CE Candidate Endangered
- WL Watch List



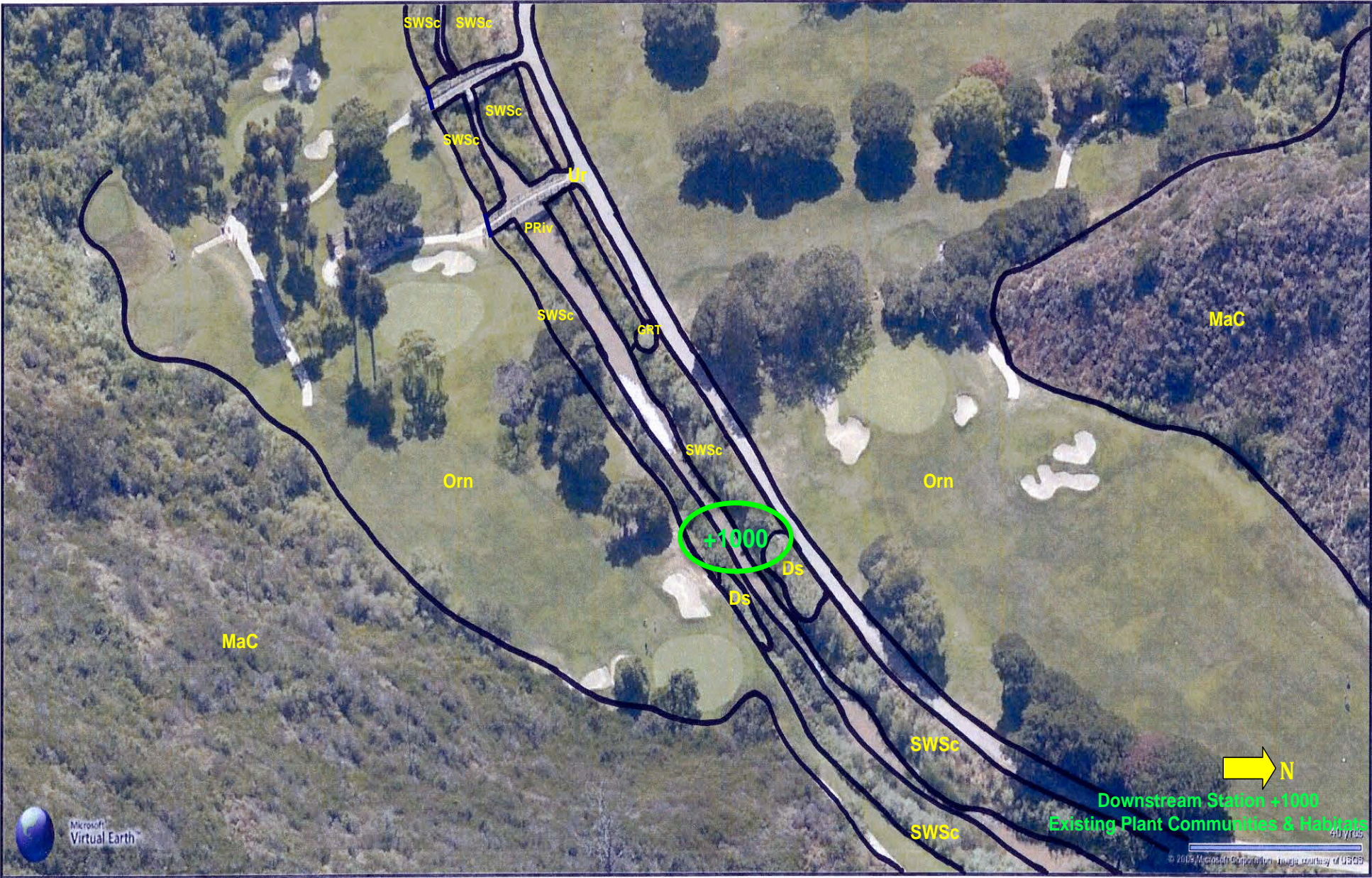
Appendix B. Vegetation Communities at Biological Monitoring Sites in Aliso Creek



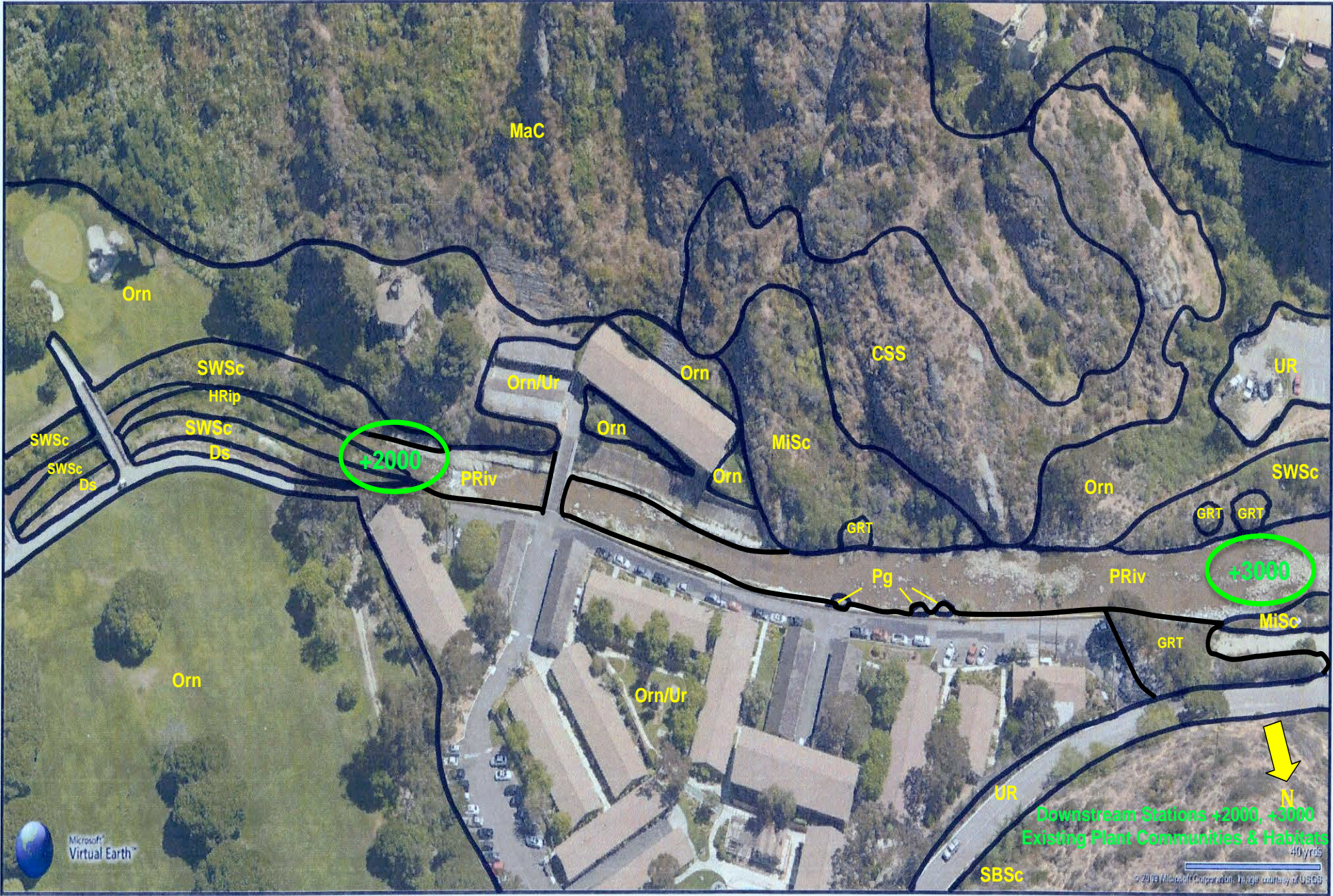


















**Appendix C**  
**Photographs of Biological Monitoring Sites**



Upstream Site -600, view downstream: December 10, 2019; Stream discharge = 6.5 cfs



Upstream Site -200, view upstream: December 10, 2019; Stream discharge = 6.5 cfs





Spill Site, view upstream: December 10, 2019; Stream discharge = 6.5 cfs



Downstream Site +200, view upstream: December 10, 2019; Stream discharge = 6.5 cfs





Downstream Site +600, view upstream: December 10, 2019; Stream discharge = 6.5 cfs



Downstream Site +1000, view upstream: December 10, 2019; Stream discharge =6.5 cfs





Downstream Site +2000, view upstream: December 10, 2019; Stream discharge =6.5 cfs



Downstream Site +3000, view downstream: December 10, 2019; Stream discharge =6.5 cfs





Downstream Site +4000, view upstream: December 10, 2019; Stream discharge = 6.5 cfs

**Appendix D. Wildlife Observed**

	Monitoring Site	11/29	12/1	12/3	12/5	12/19	
Upstream (Control) Sites	<b>-600 (Control)</b>						
	Common Yellowthroat	1					
	Yellow Rumped Warbler	3	3				
	Black Phoebe	1		1			
	American Coot	1		1			
	Northern Flicker	1					
	Pacific Tree Frog					1	
	<b>-200 (Control)</b>						
	Belted Kingfisher	1					
	Yellow Rumped Warbler	4	3				
	Black Phoebe	3	2				
	Say's Phoebe				1		
	California Towhee		3				
	Raven		2				
	Pacific Tree frog (vocal)			1			
	Nuttal's Woodpecker	1					
Ground squirrel			2	2	2		
Spill Site	<b>Spill Site</b>						
	Nuttal's Woodpecker				1		
	Orange Crowned Warbler				1		
	Say's Phoebe				1		
	Western Kingbird					3	
	Ground squirrel					2	
Downstream Sites	<b>+200</b>						
	Yellow Rumped Warbler	3		1			
	Black Phoebe				1		
	Northern Flicker		1				
	Hutton's Vireo		2				
	Pacific Tree Frog (vocal)		1				
	Western Kingbird					1	
	Monarch butterfly					1	
	<b>+600</b>						
	Common Yellowthroat		1				
	Yellow Rumped Warbler	3	3		1	1	
	Orange Crowned Warbler				1		
	Black Phoebe		2			1	
	Say's Phoebe	1				1	
	Pacific Tree Frog	2	1				
	House Wren			1		1	
	Nuttal's Woodpecker	1			1	1	
	Northern Flicker		1				
	<b>+1000</b>						
	American Coot					1	
	Com. Yellowthroat		4				
	Black Phoebe	1					
	Say's Phoebe	1					
	Anna's Hummingbird		1		1		
	American Kestrel		1				
	Northern Flicker		1				
Raven		1					
American Crow				2			
Orange Crowned Warbler		3					
Nuttal's Woodpecker		1		1			
California Towhee					1		
House Wren					1		
Western Fence Lizard		1					
Raccoon		1					
Deer					3		



Biological Resources Damage Assessment - SOCWA Spill of 11/27/19 to 11/29/19

<b>+2000</b>						
Spotted Sandpiper					1	
Common Yellowthroat	1					
Yellow Rumped Warbler	4	2		2		
Black Phoebe	1		2			
Osprey			1			
Mallard			17			
American Crow			1			
Deer			2	1		
House Wren			1			
Northern Flicker	1					
California Towhee		4				
Raven		2				
Nuttall's Woodpecker				1		
Pacific Tree Frog			1			
<b>+3000 (upper lagoon)</b>						
Spotted Sandpiper	1					
American Coot	6	18	22	17	12	
Belted Kingfisher				1		
Mallard		6		3	5	
Yellow Rumped Warbler	4	3			1	
Gadwall			6			
American Crow	3		6			
Great Blue Heron	1					
Northern Mockingbird	2	3				
Allen's Hummingbird	2					
Bushtit		15		10		
Song Sparrow					1	
Raven		2				
California Towhee		3		1	3	
Black Phoebe		2			2	
Unid. Hawk					1	
Butterfly					2	
<b>+4000 (lagoon)</b>						
Western Gull	40	40		6	4	
California Gull	10	12				
Heerman's Gull	10	10				
Ring Bill Gull	50	63			2	
Royal Tern	15	34				
Brown Pelican	1					
American Coot		4	1	1	3	
Mallard				8		
Black Phoebe			1			
Spotted sandpiper			1	1	1	
Yellow Rumped Warbler			2	1		
American Crow		4	1	1		
Willet		4				
Rock Pigeon		6				
Raven		2				
Northern Mockingbird					1	
Ground Squirrel	2					
<b>Beach (general)</b>						
Willet			1			
Unident Gulls			20	35	15	
Royal Terns				20		
Rock Pigeon			20	22	4	