STUDY REPORT FOR MAINTENANCE METHODOLOGY PILOT PROJECT

Soft-Bottom Channel Reach 24 (Compton Creek) & Reach 25 (Lower Los Angeles River)

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1.0 INTRODUCTION

The Los Angeles County Flood Control District (LACFCD) is responsible for providing flood protection to County residents through the maintenance of its network of flood channels. On an annual basis, adequate channel capacity is maintained by clearing vegetation and debris within the flood channels to reduce the risk of loss of life and/or property damages from flooding during large storm events. All soft-bottom channel (SBC) clearing activities typically begin after the bird nesting season, from September 1st through March 15, and are performed in accordance with all applicable environmental/regulatory permits. If vegetation clearing work is needed during the bird nesting season, a qualified biologist conducts nesting bird surveys (within 72 hours) prior to starting work. The biologist will identify and mark any nesting birds within the work area that are protected under the Migratory Bird Treaty Act and provide recommendations and modifications to the LACFCD maintenance procedures to protect and minimize disturbance of the nesting birds.

In cooperation with stakeholders, the Regional Water Quality Control Board, Los Angeles Region (Regional Board) and other regulatory agencies, LACFCD volunteered to conduct a Maintenance Methodology Pilot Project (MMPP) at SBC Reaches 24 (Compton Creek) and 25 (Lower Los Angeles River) during the 2015 SBC clearing. Past vegetation maintenance methodology for these two SBC reaches were altered as part of this MMPP. The intent was to investigate whether an alternative vegetation maintenance method can be used for these two SBC reaches to maintain channel capacity while using smaller rubber-tire/-track equipment and leave more vegetation and root systems in the channel. Any alteration to the preapproved maintenance methodology of the reaches and leaving additional vegetation within these SBC reaches requires further approval from all regulatory agencies, especially the U.S. Army Corps of Engineers (USACE).

1.1 Channel Assessment

SBC Reach 24 and Reach 25 are located in the Los Angeles River (LAR) watershed and were chosen for this MMPP. Both SBC reaches were originally designed by the USACE. Based on the research of the State and/or Federal list of special status species and previous biological surveys, there were no sensitive species identified in these reaches.

SBC Reach 24 is 2.5 miles in length and extends from the 91 Freeway to the confluence of Los Angeles River in the City of Compton (see Figure 1).

SBC Reach 25 is one-mile long and runs from Willow Street to Pacific Coast Highway in the City of Long Beach (see Figure 2: SBC Reach 25 - Lower Los Angeles River).

Figure 1: SBC Reach 24 – Compton Creek

Figure 2: SBC Reach 25 - Lower Los Angeles River

2.0 VEGETATION MAINTENANCE

2.1 Historic Vegetation Maintenance Practices

Maintenance activities included the use of both hand and mechanical equipment. The heavy equipment (see Attachment A) used for vegetation and incidental sediment removal includes super ten dump trucks (Photo 1), rubber-tire loaders (Photo 2), steel track D8 dozers (Photo 3), steel track loaders, mini-excavators, and 2,000-gallon water trucks.

For the maintenance of SBC Reach 24, steel track dozers and loaders were used to scrape the surface and vegetation, including root systems. To minimize erosion to the invert of the reach, maintenance activities were modified to leave "tracked vegetation" in place. This method was utilized between October 10 and October 27, 2014, which involved the use of heavy steel tracked equipment to flatten the vegetation and root system in place. Invasive species, such as castor beans and Arundo, were cleared by hand and excavators were used to remove the entire root system. Cuttings generated by the removal of the invasive vegetation were placed in tarps to ensure seedlings did not fall on the ground and to prevent possible dispersion.

For the maintenance of SBC Reach 25, steel track dozers and loaders were used to scrape the surface and vegetation, including the root system of the reach, from September 17 to October 15, 2014. Invasive species, such as castor beans and Arundo were cleared by hand and excavators were used to remove the entire root system. Cuttings generated from the removal of the invasive vegetation were placed in tarps to ensure seedlings did not fall on the ground and to prevent possible dispersion.

As part of LACFCD's standard practice for SBC clearing activities at these two nonsensitive channel reaches, a qualified biologist was onsite or consulted prior to the start of work to ensure proper removal of vegetation. The Water Quality (WQ) monitoring and Best Management Practices (BMPs) implementation were conducted in accordance to the Waste Discharge Requirements (WDR), Order No. 22-R4-2015-0032-A1. All removed vegetation and incidental sediment were placed in dump trucks and properly transported to an approved offsite disposal/landfill facility.

2.2 Vegetation Maintenance - MMPP

During the MMPP, LACFCD removed the vegetation in SBC Reaches 24 and 25 by mowing instead of scraping and/or tracking. The MMPP for SBC Reach 24 started on October 10 and ended on October 26, 2015, while the pilot project for SBC Reach 25 was performed from September 21 to October 10, 2015.

Smaller rubber-tire/-track equipment (see Attachment B) was used for the maintenance activities for the reaches. Equipment such as a rubber-track excavator with flair mower attachment (Photo 1), rubber-track skidsteer with mower attachment (Photo 2), rubber-track or equivalent excavator with bucket and grapple attachment (Photo 3), and

rubber-tire 10-cubic yard dump trucks was used to mow and remove invasive vegetation. No steel track equipment was used during the MMPP.

The following methodologies were implemented for both SBC Reach 24 and Reach 25. Vegetation along the invert was mowed to approximately 6 to 12 inches above grade using a skidsteer or a long-reach excavator with an attached mower. The clippings were allowed to be left in place. The vegetation along the water line was mowed using a long-reach excavator with attached flail mower that gently mowed the overgrowth back and away from the waterline to prevent turbidity. An excavator with flail mower was also used to mow vegetation on the side slope. All invasive species such as castor beans were removed by hand, while Arundo was removed using a long-reach excavator with a grapple attachment. The excavator with grapple carefully pulled the Arundo root system out then placed the Arundo on tarps for proper containment and disposal using front loaders and 10 cubic yard dump trucks. See Attachment C for photos taken during the MMPP.

A qualified biologist was onsite or consulted prior to mowing to ensure proper removal of invasive vegetation. WQ was monitored and BMPs were implemented. Invasive vegetation and sediment were placed in dump trucks and properly transported to an approved disposal/landfill facility.

3.0 WATER QUALITY MONITORING - MMPP

LACFCD conducted WQ monitoring during the 2014 and 2015 seasonal clearing of SBC Reaches 24 and 25 as set forth in the Study Work Plan approved by the Regional Board. The results of the monitoring events are shown in Attachment D, including, but not limited to, WQ sampling parameters, locations, sample results, observations, and comments.

3.1 Water Quality Monitoring Methodology

During the MMPP, three WQ sampling stations were established for each reach (see Figure 3 and 4): Upstream of the project, within the project, and downstream of the project. The WQ testing was performed for pH, temperature, dissolved oxygen, turbidity, and total suspended solids (TSS). These parameters were measured at least once within 7 days prior to the maintenance activities without BMPs placed downstream (preclearing baseline conditions), monitored on a daily basis during the first week of the maintenance activities, then once a week thereafter until the MMPP was completed. BMPs were placed downstream of the maintenance reach during clearing activities. A postclearing WQ testing/monitoring was conducted within 7 days after the maintenance clearing was completed without BMPs downstream (postclearing baseline condition).

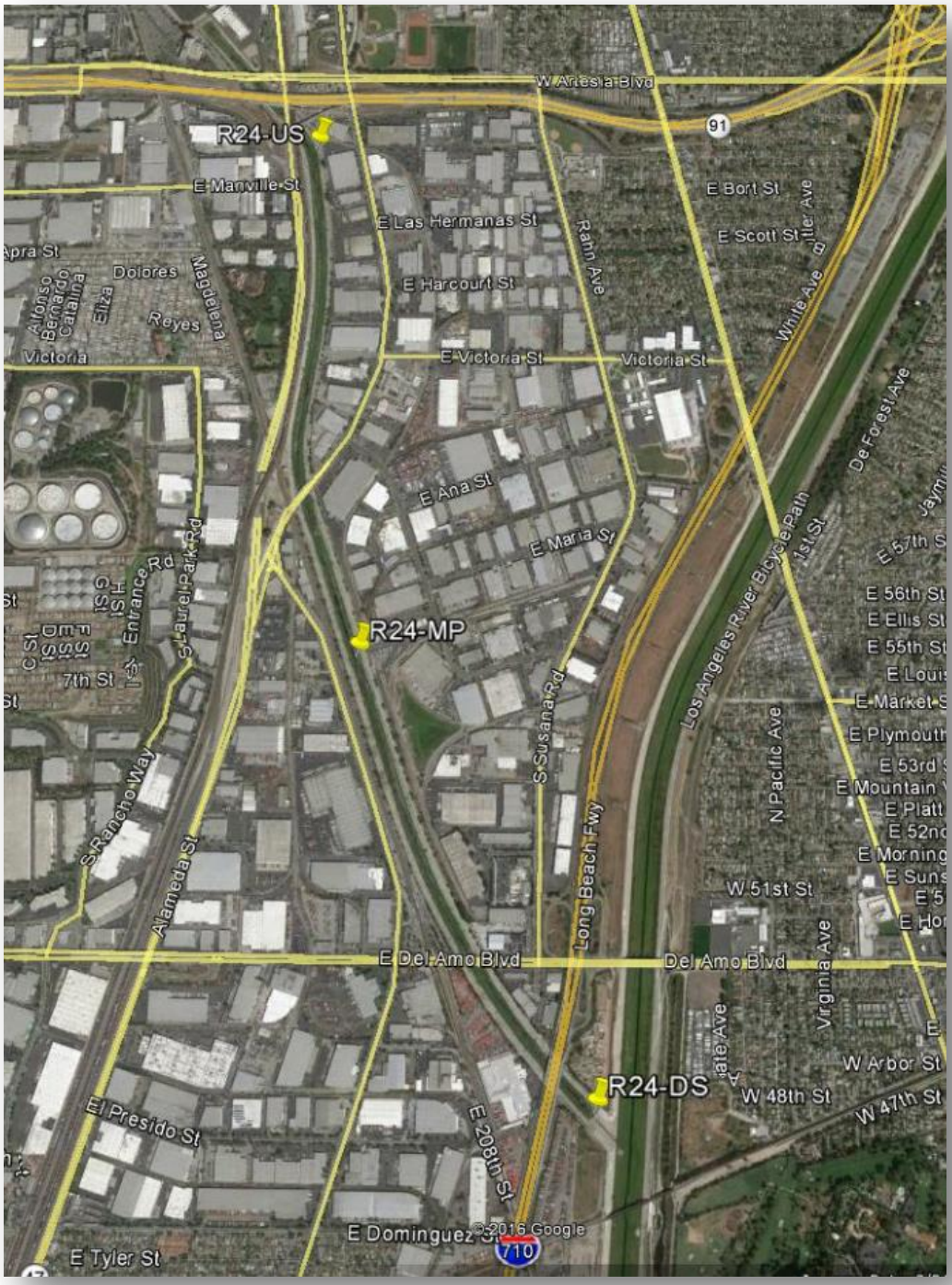

Figure 3: Sampling Location for SBC Reach 24

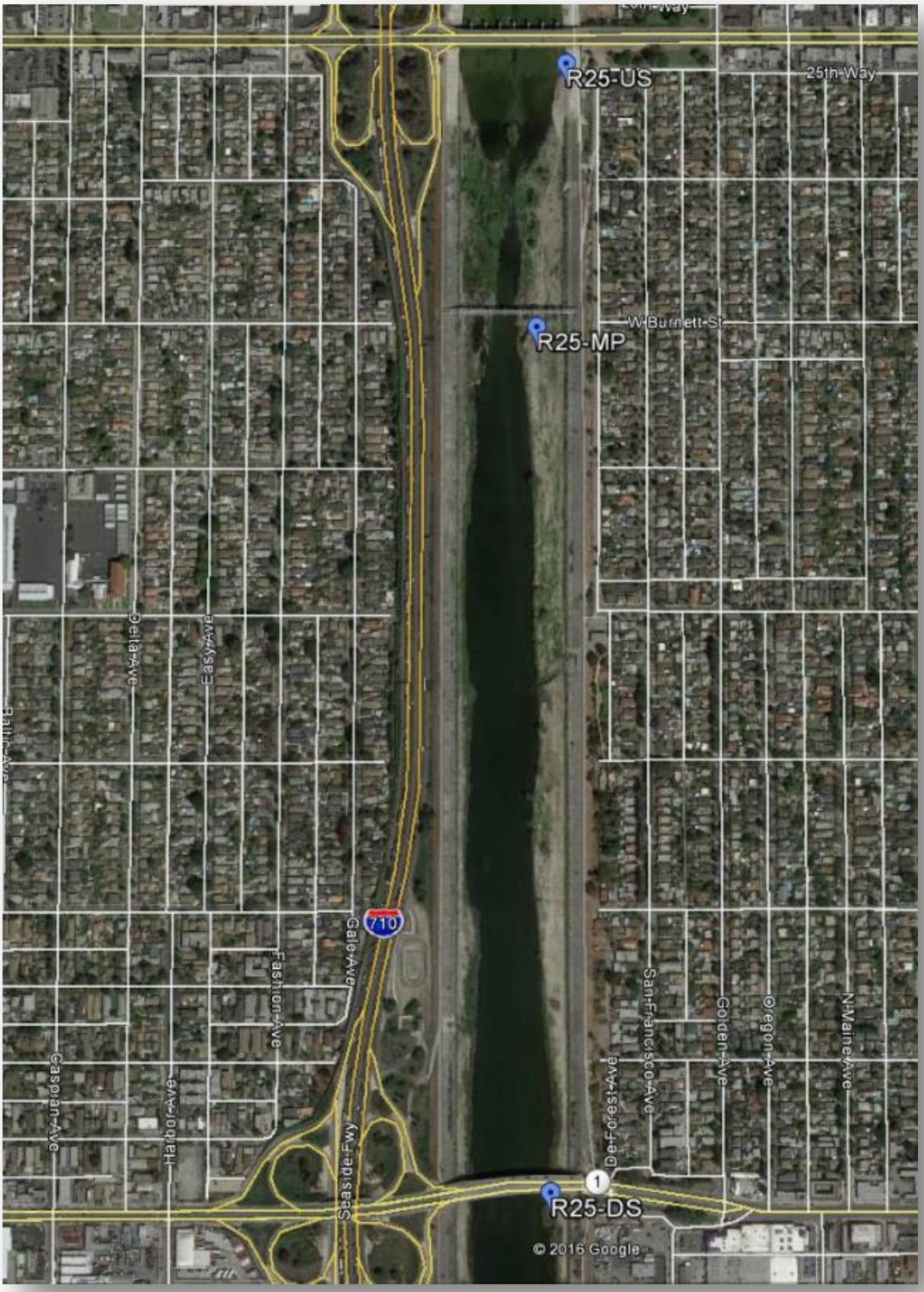

Figure 4: Sampling Location for SBC Reach 25

Onsite LACFCD staff, including the project manager, was notified each time the sampling event indicated an exceedance of downstream WQ standard limits (see Table 1). LACFCD staff stopped work immediately after exceedance notification. There is no evidence that observed exceedances were caused by the maintenance activities, however work only resumed after the downstream location was resampled and results were below the WQ limits. Additional steps were taken including, but not limited to, cleaning the downstream site BMPs or installation of additional BMPs, when possible.

Table 1: Water Quality Objectives

Parameter	Sampling Technique	Analysis Technique[1]	Analysis Location	Method Detection Limit	Duplicate precision (RPD)	Exceedance Criteria[2]
DO	Multi-meter	Field Measurement	Monitoring Points	0.01 mg/L	± 0.5 mg/L	< 5 mg/L (Warm) < 6 mg/L (Cold) > 7 mg/L
T	Multi-meter	Field Measurement	Monitoring Points	-10 °C	± 0.01 °C	Shall not be altered by more than 5 F above the natural temperature (Warm)[3]
pH[4,5]	Multi-meter	Field Measurement	Monitoring Points	0.01 pH	± 0.1 pH	< 6.5 > 8.5
Tr	Turbidimeter	Field Measurement	Monitoring Points	0.05 NTU	± 3%	20% (≤ 50 NTU) 10% (< 50 NTU)
TSS	Grab Sample	Method 2540D	Contract Laboratory	2.0 mg/L	± 10%	10%

Notes and abbreviations:

1 "Method" refers to Standard Methods for the Examination of Water and Wastewater (19th ed., APHA et al. 1995)
2 An increase in a measured TSS or turbidity reading at the downstream location, above the ambient or natural reading.
DO Dissolved oxygen
DQO Data quality objectives
RPD Relative percent difference
T Temperature
TSS Total suspended solids
Tr Turbidity
3 At no time shall these Warm-designated waters be raised above 80 F as a result of water discharges
4 For inland surface waters ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge
5 For bays or estuaries shall not be changed more than 0.2 units from natural conditions as a result of waste discharge

The LACFCD's WQ Monitoring Methodology was discussed in detail in the WQ Monitoring Guide for Maintenance and Repair Projects Involving Water Diversion, October 2015.

3.2 General Observations and Comments

In evaluating the results of the WQ monitoring events, LACFCD has the following general observations and comments:

BMPs used included fiber rolls placed perpendicular to and across the channel downstream from active clearing activities, sandbags, etc. Steps were also taken to minimize contact with water flowing within the reaches and to reduce unnecessary sediment disturbance. BMPs are generally effective in addressing the impacts of the maintenance activities in the earth-bottom channel reaches, and there is no evidence that the maintenance activities caused every observed exceedance. Despite this lack of evidence, upon noticing elevated turbidity, LACFCD field personnel acted to modify BMPs in response to the identified exceedances.

3.2.1 SBC Reach 24 (Compton Creek)

It should be noted that natural water conditions (with no maintenance activities) in Reach 24 tend to be murky as it is a main outflow for rain and debris from upstream of the reach. In 2014 maintenance activities, the upstream and within project turbidity and TSS were mostly higher than the downstream results. One turbidity result downstream of the reach was observed to be higher than the baseline condition even though the crew only performed hand clearing upstream of the reach and away from the water. Throughout the 2015 maintenance of the reach, most upstream and midpoint sampling results were higher than the preclearing baseline conditions. However, there was no water flowing at the downstream sampling point so no WQ sampling was conducted on several occasions. Sampling after rain events detected increased in turbidity throughout the channel due to ponded murky water entering from both the upstream channel reach and side outlets. This would explain why postclearing WQ sampling results were higher than the preclearing baseline condition.

During maintenance, it was observed that one or a combination of the following sources contributed to the increase in WQ effluent limits: (1) presence of stagnant nutrient-rich water ponding in the reach due to the lack of constant water flowing that when rain events occur, washouts from these ponded areas caused high turbidity downstream; (2) additional inflow of water between upstream and midpoint locations; and (3) natural variance of the reach. BMPs downstream were implemented and adjusted as-needed (such as straw waddles and sandbags, etc.). WQ sample measurements were normally taken on the easterly side of the approximate 115 foot wide channel as close to the center of the channel as possible. During the maintenance of the reach, careful vegetation removal practices were implemented so that no vegetation or debris fell into the water of the reach. No further action was taken for any exceedances not related to the maintenance activities.

3.2.2 SBC Reach 25 (Lower Los Angeles River)

It should be noted that this particular reach is heavily influenced by tidal flow due to its close proximity to the Pacific Ocean. During the 2014 and 2015 maintenance activities, it was observed that downstream turbidity of the water (data for TSS) was mostly naturally higher than the upstream turbidity for SBC Reach 25, despite the fact that no maintenance activities were being performed on or near the water. The postclearing baseline condition for turbidity and TSS were higher compared to the preclearing baseline condition due to large amount of floating and suspended material in the immediate vicinity of both the within and downstream sampling points.

Accordingly, increase in WQ test results identified during the maintenance activities were often due to natural variable conditions in the Reach's water, such as high/low tide or reverse tidal flow, not maintenance activities. Care was always taken when removing vegetation so that no vegetation or debris fell back into the water of the reach. WQ sampling measurements were taken on either the eastern or western side of the reach, since it was impossible to obtain samples from the center of the flow of water.

4.0 BIOLOGICAL RESOURCES REPORT – MMPP

Preclearing biological site visits were conducted by a qualified biologist at SBC Reaches 24 and 25 on August 17, 2015. Standard data were recorded and photos were taken from previously established photo stations. Attachment E includes the Pre- and Postclearing Forms from the 2014-2015 and the 2015-2016 SBC maintenance clearing seasons. Photos associated with these visits are included in Attachment F.

The preclearing survey of SBC Reach 24 in August 2015 indicated that the reach was dominated by riparian herb species mixed with common nonnative weedy species. Invasive plants such as Arundo (*Arundo donax*) and castor beans (*Ricinus communis*) were also reported to be scattered throughout the channel reach. SBC Reach 25 vegetation was similar to that of Reach 24 with the addition of scattered patches of willow trees. The onsite vegetation descriptions for each reach were consistent with previous years as well. As described in the applicable regulatory permits, no biological monitoring was required during the maintenance activities at either of these reaches because they are not sensitive (i.e., no special status species to monitor).

Postclearing biological site visits were conducted on October 10, 2015, for SBC Reach 24 and November 4, 2015, for SBC Reach 25. The biologist reported that all vegetation was mowed, except for some reed beds on the west bank and the protected willows on the east bank on SBC Reach 25. This was consistent with the previous year's maintenance activities. However, the roots of most species appeared to remain intact after the 2015 SBC clearing. Although the postclearing visits were conducted immediately after SBC clearing to detect new growth, it is expected that vegetation regrowth will occur within subsequent months and throughout the 2016 growing season. During previous years, rapid regrowth has also been observed within these reaches. However, initial vegetation recovery in previous years was dominated by nonnative

annual species. Low growing and bright green vegetation can be seen in 2014 post-SBC clearing photos in Attachment F.
With the MMPP's alternative clearing method used for the fall 2015 clearing activities at these two SBC reaches, roots of perennial plants are expected to remain intact. This will allow these perennial species to regrow more rapidly after the clearing activities. In these two SBC reaches, perennial plants are dominated by native species while annual plants are mostly nonnative species. As a result, this alternative clearing method is expected to increase the potential for native plant species and more shrubby vegetation to increase in these two SBC reaches.

Most nonnative plant species in the channels are annuals that specialize in invading freshly disturbed soils where they grow very quickly and take over slow-growing perennial native species. The revised SBC clearing methods may reduce the presence of disturbed soils where nonnatives can dominate and also allow strengthening of native species root systems. The combination may result in several years of changing dominant species composition in these channels. While vegetation may be similar to previous years in extent and quantity at the end of the growing season, it may likely have a greater cover percentage of native species and an overall shrubbier vegetation structure.

4.1 MMPP's Biological Assessment

With this expected shift to native dominated vegetation, wildlife species utilizing the SBC reaches are also expected to change. Species that prefer patches of bare-ground with weedy/annual grass vegetation will likely diminish in numbers within these reaches while species preferring denser, shrubbier vegetation may begin to use these channels or increase in numbers if currently present. Although some native species may diminish in numbers, in general, native species' diversity and quantity is expected to increase to some degree. The shifting of the plant and wildlife composition of these two SBC reaches may continue over the course of many years, but is eventually expected to stabilize if the pilot study's alternative clearing method was implemented on a permanent basis.

Of particular interest is the occurrence of species that are adapted to utilizing mudflat or mudflat-like habitats that are typically extensive following the traditional clearing method for these two SBC reaches. The soil disturbance associated with the scraping action to remove vegetation in the traditional clearing method appears to mimic natural scouring that occurs during flooding events. This clearing method leaves behind habitat conditions that are more similar to post-flood conditions than the alternative clearing method. The ephemeral habitat conditions that follow flooding events or, in this case, traditional clearing activities, can be very productive for many species adapted to utilize resources that may be abundant at these times. For example, the Los Angeles River Watershed Feasibility Study included pre- and postclearing bird surveys of SBC Reach 24 in 2010. At that time, the traditional clearing method was employed and created a substantial amount of mudflat-like habitat. The bird survey of this postclearing habitat in SBC Reach 24 was conducted on December 1, 2010, and identified a total of 26

species totaling 307 individual birds. Among the birds present included three shorebird species that prefer open mudflat-like habitats: killdeer (Charadrius vociferus), greater yellowlegs (Tringa melanoleuca), and Wilson's snipe (Gallinago delicate). This survey tallied to 26 killdeers, 1 greater yellowlegs, and 22 Wilson's snipe. None of these shorebird species were present during the preclearing survey of SBC Reach 24 conducted on September 15, 2010. Implementation of the alternative clearing methods is not expected to eliminate the use of SBC Reach 24 by these three species, but they may diminish over time.

Implementation of the alternative clearing methods is expected to increase use of these two SBC reaches by other bird species, including land birds that require shrubbier vegetation. The following four common species in the region are likely candidates for increased use of these two SBC reaches during the winter season if the alternative clearing methods become permanent: house wren (Troglodytes aedon), blue-gray gnatcatcher (Polioptila caerulea), hermit thrush (Catharus guttatus), and white-crowned sparrow (Zonotrichia leucophrys). Two other common species in the region that would likely use these two SBC reaches more frequently during the winter and summer season are the bushtit (Psaltriparus minimus) and California towhee (Melozone crissalis).

Subsequent annual visits to pilot study areas will document resources in much greater detail and will determine if such shifts are occurring and to what extent. Pilot studies will include an evaluation of the special status species involved, if any, and the potential short- and long- term effects these alternative clearing methods may have on local and regional populations.

5.0 COMPARISON

LACFCD's initial observation of the 2015 MMPP is as follows:

5.1 Methodology Comparison

During the 2014 and 2015 maintenance of SBC Reaches 24 and 25, switching from scraping to mowing resulted in reduced amount of vegetation and incidental sediment getting removed from both reaches. During the methodology comparison, LACFCD has the following general observations and comments:

1) Decrease in maintenance time,
2) Overall decrease in the maintenance cost for both reaches due to decrease in labor, rental and nonrental equipment, and material costs, such as gloves, machete, face shields, etc.,
3) Lower water usage since less dust suppression is needed,
4) Decrease in disposal fees due to less debris removed from the reaches,
5) Removal of invasive species by hand and excavator with grapple attachment worked well and helped ensure proper handling and disposal,

6) The use of excavator with flail mower near the waterline minimized/prevented high turbidity readings to preserve WQ,
7) New mowing process left more vegetation in place and promoted faster regrowth for habitat. Attachment G provides photos depicting vegetation growth for both Reaches after the mowing maintenance in 2015.

5.2 Water Quality

Due to the naturally variable conditions in SBC Reaches 24 and 25, there were no discernible WQ changes that resulted from switching the maintenance methodology. Most of the exceedances that were observed during the 2014 and 2015 maintenance were related to: (1) presence of stagnant nutrient-rich water ponding in SBC Reach 24 due to the lack of constant water flowing that when rain events occur, washouts from these ponded areas cause high turbidity downstream; (2) additional inflow of water between upstream and midpoint locations; (3) natural variance of the reach; and (4) tidal influence on SBC Reach 25 due to its close proximity to the Pacific Ocean.

6.0 NEXT STEP

LACFCD proposes to implement the maintenance practices presented in the MMPP in future years. As indicated previously, this will require approval from the USACE and other regulating agencies.

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