Summary Report on Biological Surveys, Permit Compliance Monitoring, and Inspection, Matilija Creek Giant Reed Re-Treatment Project, Ventura County, California

Re-Treatment No. 18 (28 May 2019 – 18 June 2019) Specification No. WP19-08(1), Project 41652

Bigcone spruce (Pseudotsuga macrocarpa) trunk transported deposited onto Matilija Creek floodplain in Reach 7a from adjacent ridgeline. This 23-inch diameter log has at least 133 annual rings.

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1.0 Introduction. The goal of the project is to remove and control non-native vegetation in the floodplain of the main stem of the Ventura River and Matilija Creek as a means of improving native habitats for wildlife in advance of the future removal of Matilija Dam. Although complete eradication of the target species throughout the project area is not possible because of constant inputs of seeds or rhizomes from source populations outside the project area boundaries, the cumulative result of the re-treatments have transformed floodplain habitats formerly infested by one or more of the target species into native habitats in which the target species are a minor component of floodplain vegetation.

The Giant Reed Removal Element began in September 2007. Re-treatments have continued at least once, and up to three times, per year to date. The last re-treatment occurred between 10 September 2018 and 4 December 2018. This report summarizes the 18th re-treatment session (28 May 2019 and 18 June 2019).

2.0 Project Area. The project area begins in the floodplain of the upper Ventura River at the Highway 150 bridge between Oak View and Meiners Oaks and extends upstream to its origin at the confluence of the main stem of Matilija Creek and the North Fork of Matilija Creek, then extends along the main stem of Matilija Creek upstream to a series of small waterfalls located at approximately 34.54048N; -119.40617W in the upper watershed. Ownership within the project area is a mosaic of private landowners, non-profit organizations (Ojai Valley Land Conservancy), County of Ventura (Ventura County Watershed Protection District, VCWPD), and federal (U.S. Forest Service) stakeholders.

The project area extends along 15.5 stream miles and encompasses more than 1,200 acres sycamore-willow-cottonwood riparian woodland, coast live oak woodland, riparian scrub, floodplain alluvial scrub and seasonal as well as perennial aquatic habitats. For reporting and mapping purposes, the project area has been divided into 13 contiguous floodplain reaches (Fig. 1). All work was conducted within the floodplain of these drainages except for a 1,200-foot long section of roadway in adjacent uplands where a target species, castor bean (*Ricinus communis*), has persisted as a seed source to floodplain habitats.

3.0 Methods. Re-treatment 18 was conducted per the permit conditions and treatment methodologies, and inspection specifications described in VCWPD Specifications WP19-08(I).

3.1 Target Species and Treatment. The nine (9) target species are invasive, non-native woody and herbaceous species that are widely distributed in the project region and that have a significant negative effect on native plant and animal biodiversity: giant reed (*Arundo donax*),

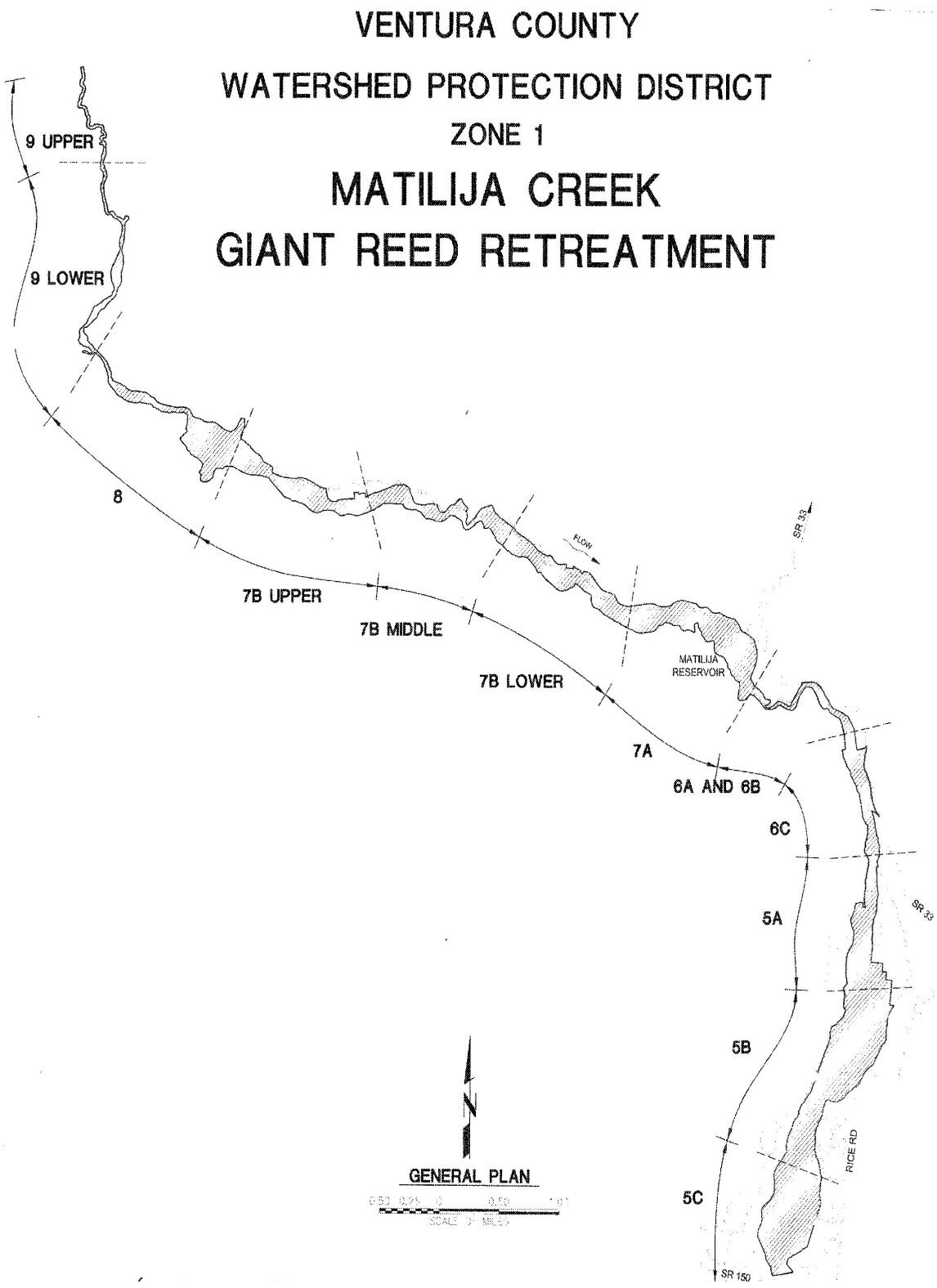


Figure 1. Project area reaches in the Ventura River and Matilija Creek watersheds. Highway 150 bridge is at bottom of figure. The main stem of the Matilija Creek sub-watershed begins in Reach 6a/6b, about 3,200 feet below Matilija Reservoir.

Scotch broom (*Cytisus scoparius*), French broom (*Genista monspessulana*), pepper trees (*Schinus molle* and *S. terebinthifolius*), cape ivy (*Delairea odorata*), castor bean, tamarisk (*Tamarix* spp.), and fountain grass (*Pennisetum* spp.). The degree of infestation of each of these species varies spatially and from year-to-year. In general, the overall infestation rate of any one species is greatly reduced from pre-project conditions as a result of the re-treatment sessions. Eradication of one or more species has been achieved in some reaches.

Giant reed, castor bean, Scotch broom, French broom, tamarisk, and pepper trees were cut at four inches or less above ground and the cut stem was daubed with a full-strength mixture of Polaris (imazapyr) and Roundup Custom (glyphosate) and blue dye, per Specification 1001-2.2. Seed heads, if present, were clipped prior to cutting the plant and bagged separately as a destruction load. Cut material was hauled out of the project area and disposed of per Specification 1001-2.4-3. Cape ivy and fountain grass was treated with a 5% glyphosate solution, non-ionic surfactant, and blue marker dye and was left to die *in situ*.

3.2 Personnel. VCWPD personnel involved with this re-treatment included Kirk Norman (Project Manager), Pam Lindsey (Watershed Ecologist), and Tyler Barns (Environmental Specialist). Hunt & Associates Biological Consulting Services provided biological surveying, permit compliance monitoring, and inspection services to VCWPD. R.A. Atmore & Sons, Inc. of Ventura, CA conducted the vegetation treatment and removal.

3.3 Biological Surveys and Biological Monitoring. The project area supports high biodiversity, due not only to the availability of seasonal or perennial water and high diversity and quality of floodplain habitats, but also because these in-channel habitats are contiguous to extensive, undisturbed chaparral, coastal sage scrub, oak woodland, and annual grassland habitats in many places, especially along broad reaches of the upper Ventura River and most of Matilija Creek. This habitat mosaic provides exceptional breeding and foraging habitat for a broad diversity of plants and wildlife, including a large number of special-status species.

Biological surveys in advance of the re-treatment session were conducted on 24 May and 1 June 2019 by Lawrence E. Hunt (Hunt & Associates). The surveys were conducted between 0700 hrs and 1700 hrs in various project reaches and focused on locating and evaluating suitable aquatic habitat for southern steelhead (*Oncorhynchus mykiss*), California red-legged frogs (*Rana draytonii*), and other aquatic-associated species. Due to the large size of the project area, Hunt & Associates also conducted a series of random-walk surveys through various project reaches where special-status species had been observed in previous years, while the re-treatment session was underway. In all of these surveys, the location of sensitive receptors (species and habitats) was noted and mapped for avoidance by work crews or more intensive monitoring during the re-treatment work. Additionally, a biological monitor/inspector(s) supervised the work crews at all times during re-treatment to ensure that impacts to biological resources were avoided. The results of these surveys/monitoring are summarized in Table 1.

This re-treatment session occurred during the bird nesting season, so focused bird surveys were conducted by Peter Gaede, avian biologist, in advance of the work crew on 23 May, 27 May, 2 June, 14 June, and 16 June 2019. Although these surveys focused on high-quality riparian woodland and riparian scrub habitat for least Bell's vireo (*Vireo bellii pusillus*), southwestern

willow flycatcher (*Empidonax traillii extimus*), and yellow-billed cuckoo (*Coccyzus americanus occidentalis*), they identified nesting habitat and/or nesting behavior in all bird species throughout the project area (Appendix 1). The location of nesting or other breeding behavior in any species was noted for avoidance or more intensive monitoring when work crews were in the vicinity.

3.4 Permit Compliance Monitoring and Inspection. Hunt & Associates provided an environmental training session to the work crew in the field on the first day of work, and as-needed whenever new crew members were added or when recurring compliance issues arose. These sessions made sure that workers were aware of the biological sensitivity of the project area, the special-status species that could be encountered during work, the target species, similar-looking native species, and how to minimize or avoid impacts to native vegetation. Particular emphasis was placed on the manner in which the crew was to conduct the work to ensure that all portions of the project area would be surveyed for the target species. The only way this is possible is with systematic transect surveys, so Hunt & Associates directed the crew to space themselves about 25 feet apart and walk together in a line back-and-forth across the floodplain from bank to bank.

Permit compliance monitoring and work inspection was conducted continuously by one or two biological monitors/inspectors, as needed. Herbicide volumes mixed and applied, application methods, and acreage treated each day was recorded on Daily Herbicide Reports (DHRs). Monitoring and inspection activities, work progress, and compliance with specifications were recorded on Inspector Daily Reports (IDRs). Daily crew staffing, hours worked, and equipment use was recorded on Inspector Weekly Reports (IWRs). These forms were submitted to the VCWPD project manager and Environmental Specialist. They are not included in the present document because of the large number of forms.

4.0 Results.

4.1 Species Observations. Surveys and field monitoring for this re-treatment session found much higher diversity and incidence of special-status species in the project area compared to previous years' re-treatments, which may be attributed to the above-average 2018/2019 rainfall year after seven consecutive years of drought. In particular, flowing and ponded surface water occurred throughout the Ventura River, main stem Matilija Creek, North Fork Matilija Creek, North Fork of the main stem of Matilija Creek, and Murietta Canyon Creek drainages before, during, and after the re-treatment, and was more evenly conveyed through multiple channels across the floodplain of the first two drainages.

Surveys of aquatic habitats in 2018 after the December 2017 fire and January 2018 debris flow noted significant sedimentation in bedrock pools and runs in Reaches 5a, 6a/6b, 7a, 7b middle, and 8 that formerly provided suitable habitat for southern steelhead, arroyo chub, red-legged frogs, and western pond turtles. Surveys in 2019 for this re-treatment noted that many of the bedrock pools in these reaches had been scoured out to their original configuration by storm flows, but many more remained filled or partially filled with sediment, conditions that will likely persist for years. In general, deep pools and runs throughout the project area have been

transformed into shallower pools and riffles that could be more prone to seasonal drying as inflows decline through the summer.

No special-status plants were found during this re-treatment. However, an unusually high diversity and density of annual herbaceous plants was noted in most reaches, probably due to the combined effects of disturbance (fire and storm flows) and above-average rainfall. These included species that have not commonly been encountered in the project area before, such as Turkish rugging (*Chorizanthe staticoides*) (extensive colonies), vinegar weed (*Trichostemma lanceolatum*), California peony (*Paeonia californica*), golden eardrops (*Dicentra chrysantha*), large-flowered phacelia (*Phacelia grandiflora*) and at least six other species of *Phacelia*, and poodle-dog bush (*Eriodictyon parryi*).

Fourteen special-status wildlife species were observed in the project area during this re-treatment (Table 1), and additional information on bird species observations are summarized in Table 1.

Table 1. Special-status species observations.

Species	Regulatory Status*	Project Reach	Observation
		Invertebrates	
Danaus plexippus Monarch butterfly	Petitioned Endangered Status	Reaches 5c-7b	Multiple dates: single butterflies observed cruising and/or foraging in project areas; regulatory status currently under review by USFWS due to significant regional population declines.
		Fishes	
Oncorhynchus mykiss Southern steelhead	Endangered	Reaches 6b	Three or four salmonids, presumed to be resident rainbow trout (land-locked anadromous steelhead), observed in bedrock pools in main stem Matilija Creek between confluence with N Fk Matilija Creek and Matilija Dam on 7 June 2019.
		Amphibians	
Rana draytonii California red-legged frog	Threatened	Reaches 7a and 7b Lower	Several adults, subadults, and larvae observed in pools in riparian woodland and riparian scrub during surveys for this project and So. Calif. Gas Company pipeline replacement surveys in Reach 7b by other biologists. American bullfrogs (*Lithobates catesbeiana*), a non-native predator of CRLF, also seen in same reaches during surveys.
		Reptiles	
Actinemys marmorata Western pond turtle	CSC	Reach 7b Lower	Several adults observed basking and swimming. Biologist conducting bird surveys found recent hatchling in patch of filamentous green algae in this reach in June 2019 (P. Gaede, pers. comm.).
Phrynosoma blainvilleii Blainville's horned lizard	CSC	Reaches 7a, 7b Upper	Two adults observed on stream terraces in open floodplain alluvial scrub vegetation on 10 and 12 June 2019.
Thamnophis hammondii	CSC	Reaches 5b, 5a,	Up to eight snakes observed in or near active

Two-striped garter snake		7a, 7b Lower, Middle, 8, and 9	channels in riparian scrub and floodplain alluvial scrub, including juveniles.
Birds			
Accipiter cooperi Cooper's hawk	State WL	Reaches 5c, 7a/7b	Several birds observed perching or foraging in project area.
Empidonax traillii subsp. Willow flycatcher	Unknown	Reaches 5c-6a/b; 7a	Up to 6 birds seen or heard singing on 24 May, 27 May, and 8 June in riparian woodland. Subspecies indeterminate, but birds present/nesting in project area in late June to mid- to late July would be the endangered taxon, *E.t. extimus*.
Vireo gilvus Warbling vireo	Watch List	Reaches 6a/b, 7a, 7b Lower	Up to 16 birds seen or heard during surveys in riparian woodland and riparian scrub habitats
Baeolophus inornatus Oak titmouse	Watch List	All Reaches	Multiple dates: single or pairs of birds observed foraging in mixed-species flocks or alone in oak woodland and riparian woodland.
Dendroica petechia brewsteri Yellow warbler	CSC	All Reaches	Up to 30 birds seen or heard during surveys; a common breeder in riparian and riparian scrub habitats.
Icteria virens Yellow-breasted chat	CSC	Reaches 6a/b; 7a	Four birds observed or heard during surveys in riparian woodland.
Mammals			
Bassariscus astutus Ringtail	Protected Furbearer	Several Reaches	Tracks and scat noted along active stream channels.
Ursus americanus American black bear	Protected Furbearer	Reach 8	Tracks observed along Matilija Creek.

***Key:**

Endangered: Listed as Endangered by the U.S. Fish and Wildlife Service under the federal Endangered Species Act

Petitioned Endangered: Petition under review by U.S. Fish and Wildlife Service to list as Endangered under the federal Endangered Species Act

Threatened: Listed as Threatened by the U.S. Fish and Wildlife Service under the federal Endangered Species Act

CSC: CA Species of Special Concern (CA Department of Fish and Wildlife, CDFW)

Protected Furbearer: (CA Fish and Game Code)

State of CA or Federal Watch List: Species experiencing regional declines (CDFW or Audubon Society).

In addition to the species observations noted during the pre-work bird surveys, nesting or other breeding behavior, such as nest building, food carrying, or feeding of fledglings was observed in at least 20 other bird species during the re-treatment work. Necessary precautions were taken by the biologist and/or biological monitor to avoid or otherwise not disturb these individuals by the work crew:

red-tailed hawk
red-shouldered hawk
cliff swallow
northern rough-winged swallow
Anna's hummingbird
yellow warbler
oak titmouse
bushtit
California scrub-jay
California towhee
spotted towhee
Eurasian starling

mourning dove
acorn woodpecker
hooded oriole
warbling vireo
lesser goldfinch
black phoebe
Pacific-slope flycatcher
common yellowthroat
song sparrow

Notably, at least 30 individuals comprising eight species of snakes were observed during this re-treatment:

common kingsnake (*Lampropeltis getula*)
coast mountain kingsnake (*Lampropeltis zonata multifasciata* – adult found crossing Matilija Canyon Road in Reach 7a by group of birdwatchers on 8 June 2019; this is only the 3rd observation of this species in the Matilija Creek watershed)
gopher snake (*Pituophis melanoleucus*)
chaparral whipsnake (*Masticophis lateralis*)
red racer (*Masticophis flagellum piceus*)
unid. garter snake (prob. *Thamnophis sirtalis*)
two-striped garter snake (*Thamnophis hammondii*)
western rattlesnake (*Crotalus oreganus*)

The greater number and diversity of snake encounters this year compared to previous Spring/early Summer re-treatments may be due to above-average rainfall during the 2018/2019 rainy season, coming after seven consecutive years of drought, that produced higher prey densities, particularly in amphibians such as Pacific treefrog (*Pseudacris regilla*), California treefrog (*Pseudacris cadaverina*), and western toad (*Anaxyrus boreas*), the larvae and metamorphs of which were common to abundant in several project reaches.

4.2 Disturbance from Fire and Storm Flows. The entire Matilija Creek sub-watershed and most of the upper main stem Ventura River watershed burned completely in the December 2017 Thomas Fire. The fire burned all of the main stem Matilija Creek and North Fork Matilija Creek sub-watersheds and much of the main stem of the Ventura River sub-watershed, including the project area extending from the upper end of Reach 5a through Reach 9. Most of the floodplain alluvial scrub and riparian scrub vegetation in the floodplain and all of the chaparral vegetation on adjacent slopes burned completely. The fire was of such intensity that leaf litter and organic matter in the top few inches of soil on the slopes and on terraces in the floodplain was burned. Riparian woodland trees in the floodplain were mostly left intact (canopies scorched in places), but the shrub understory and woody/leaf litter in these riparian habitats burned completely.

The Matilija Creek sub-watershed received over six inches of precipitation in a few hours on the evening of 8-9 January 2018, less than two weeks after the Thomas Fire, which triggered a major debris flow on denuded slopes and transported vegetation, large boulders, and topsoil onto and through the Matilija Creek floodplain. The bed elevation of extensive reaches of the floodplain between Reach 9 and the Matilija Reservoir was raised several feet by the accumulated sediment, while in other areas, the streambed was scoured several feet deep. Riparian woodland, riparian scrub, and floodplain alluvial scrub habitats were buried in sediment and piles of vegetation, rocks, and logs, or were scoured away.

Despite the significant debris flow in January 2018, the 2017/2018 rainfall year was only 54% of average, prolonging a multi-year drought over the region. The 2018/2019 rainfall year for the Ventura River watershed was 145% of normal, dropping significant amounts of precipitation via a series of storm events extending from November 2018 through March 2019. Repeated storm flows reinforced earlier patterns of sediment deposition and bed scouring, affecting stream terrace integrity and in-channel vegetation throughout the project area.

The recovery of chaparral and coastal sage scrub vegetation on the slopes adjacent to the floodplain throughout the project area continues to be impressive. Woody chaparral shrubs on slopes that were burned to ground level displayed 20-35% cover of native shrubs (from stump-sprouting) by Fall 2018. Substantial rainfall during the 2018/2019 rainy season aided recovery of native vegetation on these slopes, so that during the re-treatment session reported herein, cover estimates for chaparral on slopes next to the floodplain had increased to 60% or more (see photos in Appendix 2).

Annual and perennial herbaceous species diversity and cover within the floodplain remains high as these species colonize substrates denuded or otherwise disturbed by debris flows, sedimentation, and/or scouring. They are germinating from seeds buried in the soil seed bank and exposed and scarified by storm flows. Conspicuous examples include so-called "fire-follower" species, like island morning-glory (*Calystegia macrostegia* subsp. *cyclostegia*), woolly morning-glory (*Calystegia malacophylla* subsp. *pedicellata*), large-flowered phacelia, and poodle-dog bush (*Eriodictyon parryi*).

Trees and shrubs within the floodplain though, have been comparatively slow to recover due to repeated disturbance from storm flows during the 2018/2019 rainy season. Riparian scrub vegetation (mule-fat (*Baccharis salicifolia*) Alliance of Sawyer et al., 2008) that formerly covered extensive reaches of seasonally-active channels and floodplain alluvial scrub vegetation on stream terraces of various ages and vegetation development could take a few years to recover to pre-fire conditions. Floodplain vegetation is adapted to periodic disturbance and is responding by: a) producing new growth on major branches, or, if the trunk and branches of the tree have died, it is stump-sprouting (e.g., western sycamore, Southern California black walnut, and coast live oak); b) prolific seed production by surviving trees and shrubs (Fremont cottonwood, white alder, arroyo willow, sandbar willow, and mule-fat); c) production of adventitious roots on trunks buried in sediment (arroyo willow, sandbar willow, mule-fat).

4.3 Seasonal Timing of Re-Treatment 18. Proper timing of re-treatments is critical to long-term control and eradication of the target species and the overall cost of re-treatment. In particular, re-treatments must be timed to treat and remove target species before they have set seed in order to prevent recruitment and to eventually exhaust the seed bank in the soil. In most years, this requires primary treatment in Spring/early Summer (May-June), with a follow-up treatment in late Summer/early Fall (September-October).

4.4 Infestation of Target Species by Reach. The presence and infestation of the target species within and among reaches is highly variable (Table 2).

Table 2. Infestation of target species by project reach.

Project Reach	Target Species Occurrence By Reach During Re-Treatment 18* (28 May 2019 – 10 June 2019)							
	Giant Reed	Castor Bean	Scotch Broom	French Broom	Pepper Tree	Cape Ivy	Tamarisk	Fountain Grass
5c								
5b								
5a								
6c								
6a/6b								
7a								
7b Lower								
7b Middle								
7b Upper								
8								
9 Lower								
9 Upper								

Key: white: species not found; green: species present but sparsely distributed; yellow: species common; red: species abundant, patches common.

In general, the target species were found in much lower numbers throughout the project area during the re-treatment reported herein compared to the previous re-treatment in September-December 2018, and some species were absent or nearly absent from some reaches where they formerly occurred. This may have been due to a combination of the effects of the last re-treatment and multiple scouring storm flows during the 2018/2019 rainy season that may have buried or otherwise removed established plants. Exceptions are castor bean and Scotch broom, which showed higher levels of infestation in many reaches compared to the last re-treatment (Table 2). Germination of the seeds of both of these species is enhanced by scarification.

The seed-producing target species, such as castor bean, tamarisk, and Scotch broom, responded dramatically to the combined effects of the 2017 Thomas Fire and subsequent storm flows by germinating massively in one or more of the project reaches from the seed bank in the soil. For example, during the last re-treatment in September-December 2018, castor bean infested extensive portions of several reaches above and below Matilija Dam. These infestations persist, though in most cases, not in the densities experienced during the 2018 re-treatment session. On the other hand, tamarisk seedlings, which were abundant in substrates encrusted with mineral salts throughout Reaches 5a-c, 7a, and 7b Lower, Middle, and Upper during the drought year of 2017/2018 rainy season, had disappeared from most of the project area, possibly due to decreased salt concentrations in the soil during the above-average 2018/2019 rainy season. Scotch broom seedlings were more or less evenly distributed throughout the project area due to the effect of repeated storm flows on seed scarification and transport.

The large patch of cape ivy that formerly occurred in dense riparian woodland in Reach 7a upstream of the Reservoir was buried or removed by storm flows. One small plant was found and removed from this reach, several hundred feet downstream from its former occurrence.

Monitoring should be continued to assess and treat recurrence of this highly invasive species because of its ability to sprout from stem fragments.

Giant reed persists in areas where initial infestation (pre-2007) was high in Reaches 7a, 7b Lower, and 7b Middle. Currently, it is present as widely spaced re-sprouts either persisting in mostly dead colonies or from rhizome fragments broken from rhizome mats and dispersed by storm flows. Overall, densities of giant reed were much lower than expected, possibly due to burying or complete removal of rhizome mats by storm flows.

Fountain grass infestation is high in two reaches: Reach 6 from downstream of Camino Cielo upstream to the Matilija Dam, particularly on the slope and roadway edge along the west side of Highway 33, and in Reaches 7b Lower and 7b Middle, where it is associated with residential landscaping (Table 2). It is spreading at both locations due to vegetation management practices by CalTrans and homeowners (e.g., weed-whipping plants with seed heads during fire fuel management activities). Fountain grass also was more common than in previous years in the downstream reaches of the project area, possibly due to storm flows transporting seed from upstream sources.

4.5 Re-Treatment 18 Details.

4.5.1 Daily Progress. The crew size for Re-Treatment 18 varied from six to eight persons, typically seven persons. Beginning at the Highway 150 bridge and ending at the waterfalls in the upper watershed of Matilija Creek, Re-treatment 18 took 16 work-days to complete (28 May-18 June 2019), which is significantly lower than previous full re-treatments (Fig. 2). The contract allotted 25 work-days to complete re-treatment. The comparatively short time to completion (16 days - Fig. 2) and significantly higher average amount of acreage treated/day (73 acres - see Fig. 3), can be attributed to two factors; the first is most important: a) the overall density of the target species was much reduced compared to previous years, reflecting the combined effects of channel disturbance caused by storm flows during the 2018/2019 rainy season and the timing of the re-treatment session early in the growing season, and; b) the contractor maintained a crew size of at least six persons throughout re-treatment, which increased the amount of acreage that could be treated/day compared to previous re-treatments.

Work progress varied widely between reaches, primarily due to magnitude of infestation of target species (Fig. 4), but also because of the strategy adopted by the contractor to make two sweeps in some reaches, one to focus only on hand-pulling tamarisk seedlings and another to cut-daub all other target species. Reach-specific variation in effort during Re-treatment 17 mirrored the effort required for Re-treatment 15 (Fall 2017--the last full re-treatment of the project area prior to the current re-treatment). In both re-treatments, Reaches 7a and 7b Lower required the most effort, although re-treatment of Reach 7a took significantly less time compared to 2017 because the frequency of re-sprouting giant reed was much reduced (Fig. 4).

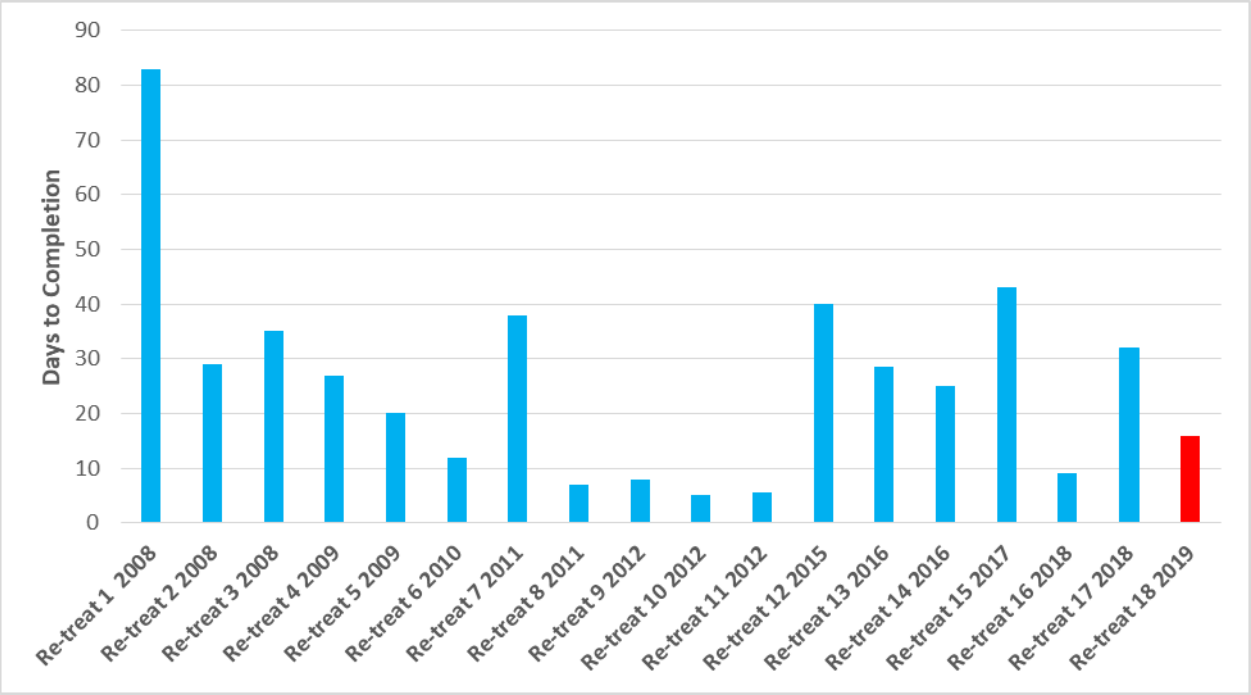


Figure 2. Time required to complete re-treatments. Initial removal of target species in 2007/2008 took 202 work-days and the first re-treatment afterwards took 83 work-days to complete. The average time to complete the other 11 re-treatments to date since the 1st re-treatment is 30.4 work-days (excluding Re-treatments 6, 8-11, and 16 because they did not involve entire project area or are otherwise unrepresentative of a typical re-treatment.

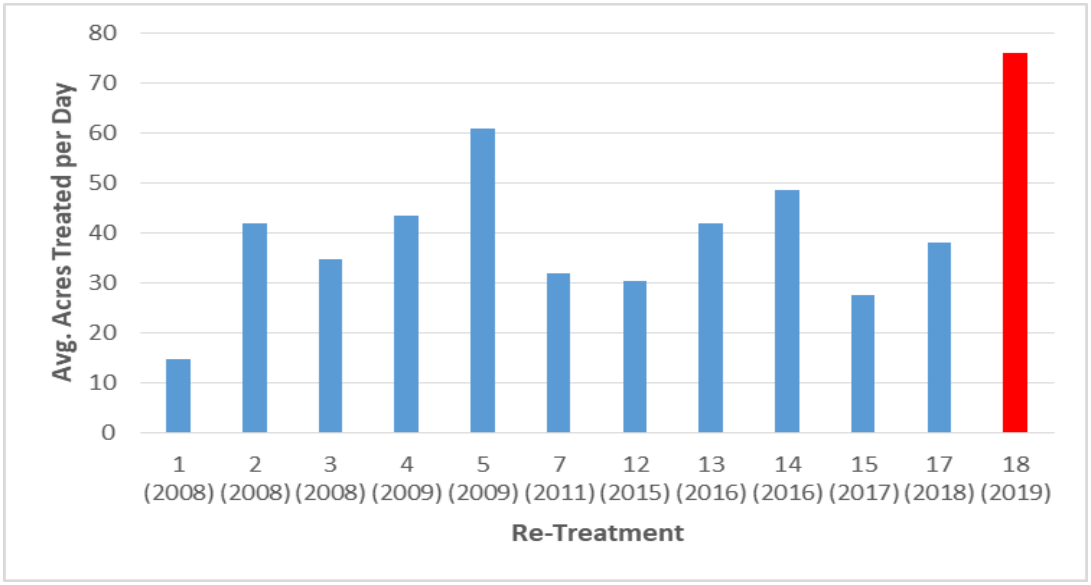


Figure 3. Average acreage treated/day (Re-treatments 6, 8-11, and 16 are not shown because they either did not include the entire project area or are otherwise unrepresentative of a typical re-treatment session).

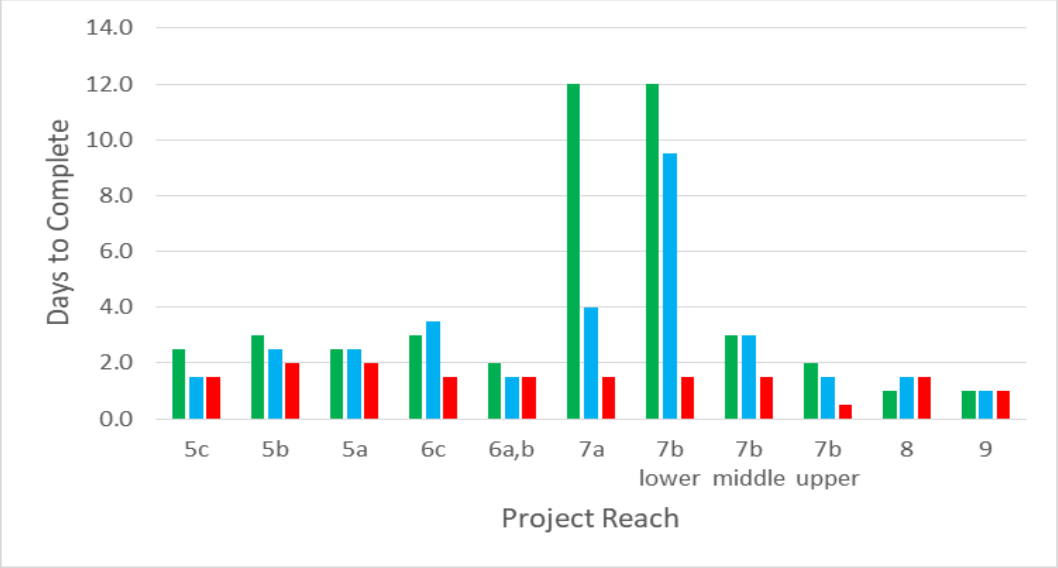


Figure 4. Work progress by project reach during Re-treatments 15 (Sep-Nov 2017) (green) and 17 (Sep-Dec 2018) (blue), compared to Re-Treatment 18 (May-Jun 2019) (red). See text for explanation.

The amount of time required to complete various project reaches was significantly lower during this re-treatment compared to re-treatments in 2017 and 2018 (Fig. 4), probably due to the combined effects of the Thomas Fire and subsequent storm flows in opening up the project area. This was particularly evident in Reaches 6c, 7a, and 7b, where target species such as giant reed, castor bean, and Scotch broom were abundant in previous years, but were only sparsely evident during this re-treatment. The seasonal timing of the re-treatment early in the growing season also may have contributed to the relatively short amount of time required for this re-treatment.

4.5.2 Herbicide Use. Table 3 summarizes amounts of herbicide mixed and applied each day during the 2019 re-treatment.

Table 3. Daily herbicide use during the 2019 is re-treatment.

Date	5% Foliar Spray			Cut-Daub Application		
	Mixed	Used	Remaining	Mixed	Used	Remaining
28 May 2019	0 gals	0 gals	0 gals	60 oz	30 oz	30 oz
29 May	2	2	0	0	30	0
30 May	2	2	0	50	25	25
31 May	2	2	0	0	15	10
3 June	2	0.5	1.5	40	30	20
4 June	0	0.5	1	0	10	10
5 June	0	1	0	40	20	30
6 June	2	2	0	0	20	10
7 June	8	7	1	20	20	10

10 June	0	0	0	24	24	10
11 June	0	0	0	20	20	10
12 June	0	1	0	20	18	12
13 June	0	0	0	20	10	22
14 June	0	0	0	20	14	28
17 June	2	2	0	0	8	20
18 June	2	2	0	0	2	18
TOTAL	**22 gals**	**22 gals**	**0 gals**	**314 oz**	**296 oz**	**18 oz**

Table 3 compares herbicide use during this re-treatment to that used in the September – December 2018 re-treatment. Herbicide use in 2019 was about 40% less than the previous year due to lower overall target species infestations in all project reaches.

Table 4. Herbicide use during Re-treatment 18 (May-Jun 2019) compared to Re-treatment 17 (Sep-Dec 2018).

Herbicide Mixture	Application	Total Volume Applied During Re-Treatment 18 (2019)	Total Volume Applied During Re-Treatment 17 (2018)
5% solution of Roundup Custom, surfactant, and colorant	Foliar spray cape ivy and fountain grass	22.00 gals.	32.93 gals.
1:1 full-strength mixture of Roundup Custom (53.8% glyphosate) and Polaris (28.7% imazapyr), and colorant	Cut-daub giant reed, castor bean, Scotch broom, French broom, and pepper trees	2.31 gals.	4.02 gals.
Total Glyphosate Product Application		**2.26 gals.**	**3.66 gals.**
Total Imazapyr Product Application		**1.16 gals.**	**2.01 gals.**

4.5.3 Permit Compliance/Inspection Issues. The following permit compliance issues arose during this re-treatment and were resolved with Field Directives from the biologist/inspector and/or monitor/inspector. No Non-Compliance or Stop Work orders were issued.

- **Specifications 1000-15 and 1001-1: Missed target species.** This was a daily occurrence as crews routinely missed target species despite measures to ensure full coverage of project area (transects). Resolution: "tailgate" training at least once/week emphasizing need for systematic transects to completely cover project area. Only solution is constant monitoring by biological monitor/inspector at all times and re-directing crew to return to areas to treat missed plants.

- **Specification 1000-20: No smoking.** One crew member was observed smoking while on break in the project area. Resolution: Inspector told person to immediately stop smoking and said he would be barred from the project area if a 2nd infraction occurred.
- **Specification 1001-2.4: Cut-daub methods.** Castor bean and tamarisk were present as seedlings in extensive portions of some project reaches and could not be cut-daubed. Foliar application of herbicide to these extensive areas was impractical, except where locally dense aggregations occurred. Resolution: Inspectors allowed crews to hand-pull castor bean seedlings wherever they occurred.

5.0 Ecotopia Parcel. The approximately 17-acre Ecotopia parcel located in the floodplain of Matilija Creek at the downstream end of Reach 7b Middle was until 2016, part of the project area. At that time, Ecotopia personnel said they would treat the non-native target species themselves. Site visits by VCWPD staff (Pam Lindsey and Megan Doran) and Lawrence Hunt (Hunt & Associates) in April and December 2018 verified that they are cutting giant reed where found, but there is no indication that they are applying herbicide to cut stems and they are leaving the cut stems in the floodplain where they are cut instead of hauling them out. Hunt & Associates noted during the 2019 re-treatment that Scotch broom, which they are not controlling, is proliferating across the Ecotopia parcel, and presents a significant source of seed input to the project area downstream of the parcel. VCWPD will continue to conduct quarterly site visits to the parcel to monitor infestation of the target species.

6.0 Literature Cited.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2008. A manual of California vegetation, 2nd ed. CA Native Plant Society and CA Department of Fish and Wildlife, Sacramento, CA. 1,300 pp.

VCWPD (Ventura County Watershed Protection District). 2019. Plans and specifications for construction of Matilija Creek giant reed retreatment. Specification No. WP19-08(1), Project No. 41652. Ventura, CA.

APPENDIX 1. BIRD SURVEYS

To: **Larry Hunt**
Hunt & Associates Biological Consulting Services 5290 Overpass Road, Suite 108
Santa Barbara, California 93111

From: **Peter Gaede, Avian Biologist**

Date: **July 6, 2019**

Re: **Bird surveys conducted in advance of exotic plant retreatments (Ventura County Watershed Protection District Invasive Plant Removal Project) along the Ventura River and Matilija Creek in Ventura County.**

Survey Conditions and Locations.

Table 1. Dates, location, and results of bird surveys.

Survey	Date	Time (24 hours)	Weather	Location	Number of Species Recorded	Number of Individuals Recorded
1	May 23	0900-1200	Overcast, calm, 55°F.	**Reach 7A**; Matilija riparian woodland upstream of reservoir.	41	363
2	May 27	0700-1600	Clear to partly cloudy, 52-70°F; calm to WNW wind 5MPH.	**Reach 5** and the southern portion of **6** (Camino Cielo south to Highway 150).	53	368
3	June 02	0700-1200	Overcast, clam, 56°F, ground damp from heavy moisture.	The northern portion of **Reach 6** (Camino Cielo north to the base of Matilija Dam).	41	159
4	June 14	0900-1300	Overcast, calm, 65°F.	**Reach 7A** and the western portion of **7B**.	37	108
5	June 16	0730-1230	Mostly cloudy at start clearing	Portions of **Reach 8** above USFS gate.	29	106

			by mid-morning, calm, 62°F.			

Survey Results.

Migrant willow flycatchers were recorded on the May 24 and May 27 surveys. No least Bell's vireos or yellow-billed cuckoos were detected. One active raptor nest was found in Reach 5 (a red-tailed hawk), and breeding was confirmed for 17 additional species (Table 2). A total of 77 bird species were recorded on all surveys combined (Table 3). General habitat evaluations were made during the surveys, with emphasis on special-status species with likelihood to occur within the survey area (southwestern willow flycatcher, least Bell's vireo, and yellow-billed cuckoo). Four CDFW Bird Species of Special Concern were recorded during the surveys. These included: yellow warbler, yellow-breasted chat, southern California rufous-crowned sparrow, and Cooper's hawk. Brown-headed cowbirds were recorded in low to moderate numbers. Bird species and numbers were recorded by sight and sound during two surveys in May and three in June 2019. A species list for each survey is included in Table 3.

The Thomas Fire, active from December 2017 through January 2018, burned a high percentage of the riparian vegetation within the survey area. Since the fire, the native riparian vegetation has rebounded.

Table 2: Bird breeding activity.

Species	Date	Reach	Description
Acorn Woodpecker	May 27	6a/b	Adults feeding young in nest cavity near Camino Cielo.
Red-tailed Hawk	May 27	5a	Nest in Eucalyptus tree with one older nestling; adults present.
Bushtit	May 27	6a/b	Adult carrying food.
California Towhee	June 16	8	Adult feeding fledgling
Hooded Oriole	May 27 and June 16	6a/b	Several active nests were found in palm trees below Matilija Dam.
European Starling	June 02	6a/b	Nest with young above Camino Cielo.
Warbling Vireo	June 02	6a/b	Adults feeding fledglings.

California Scrub-jay	May 27	5c	Adult nest-building.
Yellow Warbler	May 27 and June 2	6a/b	Adult feeding fledgling near the Camino Cielo bridge.
Lesser Goldfinch	May 27	6a/b	Pair nest-building in California Sycamore.
Cliff Swallow	May 27	5a	Multiple nests being constructed on the Robles Diversion concrete structure.
Bullock's Oriole	May 27	5a	Adult nest-building.
Black Phoebe	May 27	6a/b and 7b	Nest under bridge over Camino Cielo (Reach 6) and along edge of channel (Reach 7B).
Pacific-slope Flycatcher	May 23	7a	Nest with eggs.
Anna's Hummingbird	May 27	6c	Female nest-building.
Brewer's Blackbird	May 27	5a	Adult carrying food.
Song Sparrow	May 27 and June 02	6c, 6a/b	Juveniles seen.
American Robin	June 02	6a/b	Adult with juvenile.

Table 3. Species and numbers of birds recorded during five surveys along the Ventura River and Matilija Creek.

Species	Survey Number				
	1	2	3	4	5
Mallard	8	38		2	
Common Merganser	1	1			
Ruddy Duck	2				
Mountain Quail	1		8	2	
California Quail	1	8		2	6
Pied-billed Grebe	2				
Band-tailed Pigeon	2	1	5		16
Mourning Dove		26			
Vaux's Swift	80				
White-throated Swift	30			4	2
Black-chinned Hummingbird		1	2	2	
Anna's Hummingbird		7	1	3	5
Allen's Hummingbird				1	
Costa's Hummingbird		1	4	2	4
American Coot	9		1		
Killdeer	1	10			
Turkey Vulture	9	14	3	6	
Red-shouldered Hawk		1			
Red-tailed Hawk		4	4		
Cooper's Hawk				1	
Acorn Woodpecker		2	3		
Nuttall's Woodpecker	2	1	1	3	3
Downy Woodpecker			3		
Hairy Woodpecker	3	1		1	
Northern Flicker	1	1	2	2	
American Kestrel				2	
Ash-throated Flycatcher	4	8	1	5	6
Cassin's Kingbird		1			
Western Wood-pewee	1	3	3		
Willow Flycatcher	1	3			
Pacific-slope Flycatcher		4	8	5	3
Black Phoebe		7	2	4	1
Hutton's Vireo				2	
Warbling Vireo	5	3	5	3	
Steller's Jay		1	2		2
California Scrub-Jay	2	10	2	6	1
American Crow		2			
Common Raven	2			4	1
Violet-green Swallow	75				

N. Rough-winged Swallow		1			
Cliff Swallow	50	60	3		
Oak Titmouse	4	4	1	3	2
Bushtit	9	22	3		
White-breasted Nuthatch			1		
Canyon Wren		1	1		1
House Wren	7	15	18	5	6
Bewick's Wren		2	1		2
Blue-gray Gnatcatcher	1		1	2	
Wrentit	1	3		2	2
Western Bluebird		2			
Swainson's Thrush	8				
American Robin	1	6	2		
California Thrasher		1			
Northern Mockingbird		2			
European Starling		1	4		
Phainopepla		8	1		
House Finch	2	15	9	5	1
Purple Finch					2
Lesser Goldfinch	2	11	14	4	2
Lawrence's Goldfinch		2		2	3
Rufous-crowned Sparrow					2
Song Sparrow	8	3	8	3	
Spotted Towhee	1			1	1
California Towhee		9		2	8
Yellow-breasted Chat	2			2	
Hooded Oriole	1	9	11	3	1
Bullock's Oriole		5	2		
Red-winged Blackbird	7				
Brewer's Blackbird		1			
Brown-headed Cowbird		8	4		
Common Yellowthroat	2	1		1	
Yellow Warbler	11	5	8	4	2
Orange-crowned Warbler			1		4
Wilson's Warbler	1				
Western Tanager			3		
Black-headed Grosbeak	3	6	1	3	8
Lazuli Bunting		6	2	4	9

Conclusions.

Willow Flycatcher (*Empidonax traillii*)

Willow Flycatchers are expected to use the area during spring and fall migration. Differentiating between the endangered "Southwestern" subspecies (*Empidonax traillii extimus*) and the other subspecies that migrate through the area is extremely difficult in the field. Direct observation of breeding and/or detections between the time period of June 22 and July 17, when migrants have passed, is the best way to confirm. All of the willow flycatcher subspecies are long-distance migrants that could be present during the northbound (spring) and southbound (fall) migrations. The riparian habitat within the surveyed watershed represents excellent migratory stopover habitat, which is an integral component for the species survival during migration and dispersal. Migrant willow flycatchers were detected on the May 23 and 27 surveys on the Ventura River and in Matilija Canyon behind the lake. Additional incidental observations were made by Peter Gaede and others in spring 2019 behind Matilija Lake in Reach 7A. Of note were four willow flycatchers that were found singing in the riparian area behind Matilija Lake on June 08, where suitable breeding habitat exists. These birds were not detected in this area during subsequent surveys (e.g. June 14), and were presumed to be late migrants of one of the northern subspecies.

Suitable breeding habitat for willow flycatchers exists within the survey area. Two areas that look particularly suitable are the area behind Matilija Lake in Reach 7A and the stretch above the Robles Diversion Dam along the Ventura River in Reach 5. Both areas have a number of characteristics of suitable breeding habitat with appropriate vegetation structure. Both area include areas of dense willows of multiple species 3-10 feet in height with adjacent open areas, are located within a low gradient stream channel greater than 30 feet, with have standing and/or gently flowing water nearby. The latter area is early successional (post-Thomas fire) and will likely increase in quality in the next 1-3 years.

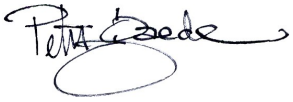
Least Bell's Vireo (*Vireo bellii pusillus*)

This species is most likely to occur as a migrant in both spring and fall, and should be looked for. Dispersing birds and/or migrants have a high potential to occur, but in small numbers. Breeding habitat may exist as well, and given that the species is increasing in numbers at nearby breeding locations, is should be surveyed for in future years.

Western Yellow-billed Cuckoo (*Coccyzus americanus*)

This species could potentially use the riparian corridor during migration or dispersal. The mature cottonwood riparian forest behind Matilija Dam is the most likely location for the occurrence of this species, and probably provides the best suitable habitat for migrating and/or wandering birds. There is one previous record for this species at this location in summer, but no breeding behavior was observed. This species is extremely rare as a breeder in California and in the west, and requires large and extensive riparian forests and a suitable prey base to breed. While suitable breeding habitat appears to exist behind Matilija Lake from a vegetative standpoint, the overall size of the patch is

probably too small and the likelihood of such a rare species occupying the area is unlikely.



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APPENDIX 2. SITE PHOTOGRAPHS

General aspect of streambed of Ventura River in Reach 5c during Re-Treatment 18, looking north (upstream). 28 May 2019.

Condition of floodplain along main stem Matilija Creek in Reach 7b Lower. Prior to the Thomas Fire in December 2017, this reach supported closed-canopy riparian woodland and riparian scrub vegetation. Aspect after fire and storm flows is now very open. Note trunks of riparian trees burned in the fire, now re-sprouting from base, saplings of arroyo willow (*Salix lasiolepis*) and Fremont cottonwood (*Populus fremontii*) colonizing stream terrace, as well as sedimentation and woody debris piles deposited by storm flows during 2018/2019 rainy season on stream terrace in foreground. Poodle-dog bush (*Eriodictyon parryi*), a fire/disturbance-following species, is flowering in center of photo (purple flowers). 12 June 2019.

Damage to wetlands and riparian woodland in Reach 7a by vehicles accessing streambed from Matilija Canyon Road at confluence of Rattlesnake Canyon with Matilija Creek (former K-Rail Trail"). 17 June 2019.

Vehicular damage to wetlands and vegetation in Reach 7a. Adult California red-legged frogs (*Rana draytonii*) were found here on 17 June 2019.

Vegetation removal and sedimentation along primary channel of Matilija Creek on S edge of floodplain, looking east (upstream) due to winter 2018/2019 storm flows). Bed elevation has been raised at least three feet along this reach. This area formerly supported dense colonies of giant reed that were removed during previous re-treatments, allowing a dense native understory to form, now removed. 17 June 2019.

Burial of riparian trees in Reach 7a by sediment transported during 2017/2018 rainy season. Formerly dense understory vegetation has been all but removed by storm flows. 17 June 2019.

Former closed-canopy riparian woodland in Reach 7a where dense understory of native riparian trees and shrubs was removed by storm flows during the 2018/2019 rainy season. Cocklebur (*Xanthium strumarium*), a native shrub, is colonizing bare substrates here. 17 June 2019.

Bigcone spruce (*Pseudotsuga macrocarpa*) log (23 inches in diameter) transported by 2018/2019 winter storm flows into Matilija Creek streambed in Reach 7a from adjacent ridgelines. Twenty-two inch diameter log shows at least 133 annual rings. 17 June 2019.