MATILIJA DAM GIANT REED REMOVAL PLAN

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1.0 INTRODUCTION

The Giant Reed Removal Project (Project) is one component of the larger Matilija Dam Ecosystem Restoration Project, which is the result of more than five years of collaboration with stakeholders and experts. The Project is sponsored by the Ventura County Watershed Protection District (District) and being conducted under the Proposition 40 Consolidated Grant from the California State Water Resources Control Board. The goal of the Project is to substantially reduce the abundance and distribution of invasive plants which consume large quantities of water, displace native vegetation and wildlife, disperse readily during floods, and exacerbate flooding, erosion, and fire intensity. The outcome of the Project is recolonization of native vegetation and restoration of native habitats.

The Matilija Dam Ecosystem Restoration Project Feasibility Study Environmental Impact Statement/Environmental Impact Report (EIS/EIR), dated September 2004, was adopted by the Ventura County Board of Supervisors on December 14, 2004. Subsequently, a Biological Opinion was issued by the U.S. Fish and Wildlife Service (USFWS) for the complete Project on March 31, 2005. In the original Project, the Giant Reed Removal Project was to occur after the removal of the Dam. However, the schedule for giant reed (*Arundo donax*) removal has been accelerated by the availability of 2005-2006 Consolidated Grant Program funding. The funding for this Project has two significant constraints that have driven the approach of the Giant Reed Removal Plan (Plan). The first issue is budget; initially, $3.3 million was identified for treatment of 140 acres of giant reed, which averages $23,000/acre. Although the budget initially appears sufficient, much of the infestation occurs within existing native habitat that is occupied by sensitive species, which restricts the use of cost-saving techniques such as heavy equipment in some areas. Secondly, the grant ends in August 2008, which requires that all the permitting, Planning and bid preparation occur prior to the narrow initial treatment window of roughly September 1, 2007 to December 30, 2007. This timeframe takes into account the limitations of two sensitive birds, the Federally-endangered and State-endangered least Bell's vireo (*Vireo bellii pusillus*) and listing southwestern willow flycatcher (*Empidonax traillii extimus*), and the Federally-threatened California red-legged frog (*Rana aurora draytonii*) breeding seasons and the approximate time (December) that giant reed goes dormant in the area.

The Giant Reed Removal Plan provides guidelines and treatment methodologies for the removal of approximately 208 acres of target invasive weed infestation dominated by giant reed within the 1,274-acre Project Area. The additional target species to be addressed under the Plan include castor bean (*Ricinus communis*), salt cedar (*Tamarix* sp.), Scotch broom (*Cytisus scoparius)* and Peruvian pepper trees (*Schinus*). Giant reed makes up a substantial portion of the existing vegetation in the former Matilija Reservoir area and has infested the entire Project Area. Giant reed is defined by the California Invasive Plant Council as a widespread, mostly invasive wildland pest (List-A-1). It disperses during high-flow events that dislodge individual plants and large stands, and spreads aggressively because it develops viable roots from the nodes of plants and plant fragments. Populations of giant reed are expected to increase throughout the Matilija Creek and Ventura River system if the population is not controlled. The giant reed population in the Matilija Reservoir is a source of giant reed propagules for the lower watershed as plant material is washed downstream during large storm events. Controlling giant reed in the upper watershed reduces giant reed dispersal to the lower river reaches and minimizes reestablishment. Through the EIS/EIR, the District has committed to long-term monitoring and adaptive management. Following completion of the Project, monitoring and reporting will be done annually for a period of at least five years, continuing past the grant period.

1.1 Project Benefits

Giant reed control is a first step toward ecosystem restoration in the Ventura River and Matilija Creek, which is heavily infested with this invasive plant. As further described below, Project benefits include:

- improvement of water quality,

- restoration of biological habitat,
- reduction of flood hazards, and
- reduction of fire risks.

Giant reed, due to its biomass, uses more water than native riparian vegetation. Control of giant reed infestation in the Project Area would increase the amount of recharge to the local groundwater aquifer, estimated at 3,360 acre-feet per year. Native plants that recolonize the giant reed removal area are expected to take up nutrients, thereby positively affecting pollutant loads in surface water. The reduction in the spread of exotic vegetation and maintenance of high quality wetland habitat would aid in the long-term attainment and maintenance of the water quality objectives set in the Los Angeles Regional Water Quality Control Board Basin Plan.

The increased amount of water in the stream would improve aquatic and terrestrial habitat. Giant reed does not provide high quality food or habitat for wildlife. Restoration of native riparian habitat would increase the amount of available suitable habitat for least Bell's vireo, southwestern willow flycatcher, California red-legged frog, and southwestern pond turtle (*Clemmys marmorata pallida*), as well as 25 additional sensitive species. The increased amount of water available for instream use would contribute to the restoration and enhancement of southern steelhead (*Onchorynchus mykiss*) migration and spawning.

Removal of giant reed would reduce flood hazards. During high floods, giant reed stems and rhizomes break off and are washed downstream, where they can form debris dams and damage existing infrastructure such as bridge abutments and culverts. Plant material that ultimately ends up along County beaches requires collection and disposal to landfills. These flood hazards would be reduced with the control of giant reed and reestablishment of native riparian vegetation.

Removal of giant reed would reduce fire risks by reducing the overall fuel load. Giant reed is highly flammable when dead and when the leaves are green. In areas where giant reed has taken over, the risks and intensity of wildfire have increased. Control of giant reed will reduce the fire risk by reducing the amount of fuel or biomass. Near residential development, giant reed stands will be cut and the biomass removed off-site, resulting in an immediate reduction in fuel. Stands treated by foliar application lose their leaves and small stalks fall to the ground resulting in a significant reduction in the standing biomass over a 3 to 4 month period.

1.2 Project Area

The Project Area includes the floodplain of Matilija Creek and the Ventura River, beginning at the downstream end at Highway 150 and extending upstream approximately 2,000 feet past the falls. Matilija Creek and the Ventura River were divided into a series of reaches for the EIS/EIR for the Matilija Dam Ecosystem Restoration Project, with Reach 1 beginning at the Ventura River Estuary and Reach 9 extending into the upper Matilija Creek watershed. This Project's area includes Reaches 5 through 9 with Reach 7 split into two sections; Reaches 7A and 7B (Figure 1). The Project Area comprises approximately 1,274 acres and 14.9 river miles. Giant reed removal downstream of Highway 150 will be completed with other funding at a later date along the Ventura River.

The Project reaches are defined as follows:

Reach 5: Highway 150 Bridge to the upstream end of Robles Diversion Facilities, approximately 3.3 river miles.
Reach 6: Robles Diversion to the Matilija Dam; approximately 2.1 river miles.
Reach 7A: Matilija Reservoir from the dam upstream approximately 1.3 river miles.
Reach 7B: Begins approximately 1.3 river miles from the Matilija Reservoir dam and extends approximately 4 river miles upstream.

Reach 8: Begins approximately 5.3 river miles upstream of the Matilija Reservoir dam and continues approximately 1.6 river miles upstream to the confluence of Old Man Creek and Matilija Creek.

Reach 9: Begins at the confluence of Old Man Creek and Matilija Creek and continues approximately 2.6 river miles upstream.

This Plan includes a description of the covered target invasive species (Section 2), the proposed treatment methodologies (Section 3), the invasive infestations and biological constraints by reach (Section 4), proposed Best Management Practices and mitigation measures (Section 5), and monitoring proposed during construction as well as monitoring treatment effectiveness (Section 6).

1.3 Project Time Frame

The Project will include an initial treatment of the target invasive species and subsequent retreatment over the 5 year monitoring period. The initial treatment will occur outside of the bird breeding season from September 1 through approximately December 30, 2007. Retreatment is expected to occur in approximately 20 percent of the Project Area. Retreatments are anticipated to occur during the bird breeding season for the first two years after the initial treatment (Spring and Summer 2008/2009) and outside of the bird breeding season (September 1 through March 15) for the last three years of retreatment. Retreatment will involve the treatment of isolated patches of resprouts. The time and intensity of the retreatment effort is significantly less than the initial treatment, which is discussed in greater detail in Sections 3 and 4.

2.0 BIOLOGICAL RESOURCES

The following assessment of biological resources within the Project Area is based on a literature review and a field study to assess the level of infestation by the five target invasive species present within Reaches 5 through 9. Polygons within each reach were digitally delineated in the office based on observable vegetation and habitat differences on aerial photo imagery. Approximately 690 polygons throughout the Project Area were surveyed by walking through each polygon. The minimum mapping unit was approximately 0.5 acre for infested areas and approximately 2 acres in vegetation communities with low infestation. In some cases where the vegetation (typically giant reed stands in Reaches 7A and 7B) was either too dense or was inaccessible, a visual estimation from a high vantage point utilizing binoculars and aerial imagery was used in lieu of walking. Vegetation surveys were conducted in February and March of 2007. Trees comprising the upper canopy were leafless at this time, allowing for good visibility of understory invasive plants. During the field assessment, polygons were assigned a level of infestation according to the following categories: 0%, <1%, 2-5%, 6-10%, 11-24%, 25-49%, 50-75%, 76-85%, and 86-100%. The acreages below are based on taking the middle value from these range categories. During these surveys, information on vegetation community, and the suitability of the habitat polygons for the least Bell's vireo, southwestern willow flycatcher, and California red-legged frog were also collected.

2.1 Target Invasive Plant Species

2.1.1 Giant Reed

Giant reed is a robust perennial grass 6 to 30 feet tall, growing in multi-stemmed, cane-like clumps, spreading from horizontal rhizomes below the soil, and often forming large colonies many meters across (Figure 2a). Giant reed can quickly develop into a monotypic stand throughout a riparian area. Individual stems or culms are tough and hollow, divided by partitions at nodes like bamboo. First-year culms are unbranched, with single or multiple lateral branches from nodes in the second year. The pale green to purple-green leaves, which broadly clasp the stem with a heart-shaped base and taper to the tip, are up to two feet or more in length. Leaves are arranged alternately along the culm, distinctly two-ranked (in a

single plane). Giant reed produces a tall, plume-like flowerhead at the upper tips of stems, the flowers closely packed in a cream to brown cluster borne from early summer to early fall. Culms may remain green throughout the year, but often fade with semi-dormancy during the winter months or in drought. Giant reed is capable of reproducing readily either by new rhizomes that were not systemically eradicated, or from any leaf that may have received insufficient application of herbicide. The ability for giant reed to regenerate is tremendous and can pose the greatest threat to a successful eradication effort. Additionally, the roots can reach depths of ten feet, making mechanical removal extremely difficult. Giant reed biomass will be chipped and used as landscape mulch or left on site in thin layers. Approximately 160 acres of giant reed were mapped within all reaches of the Project Area (Figure 3a, b, c, d and Figure 4a, b, c, d).

2.1.2 Peruvian Pepper Tree

Pepper tree is a large spreading tree growing to a height of 40 feet with a round crown with drooping lacy foliage (Figure 2b). Leaves are arranged alternately and pinnately compounded throughout the culm. Each leaf is eight to 14 inches long, often curved, and contain numerous (19 to 40) lance-shaped leaflets, each of which are one to three inches in length. The leaf has a peppery fragrance and is green-yellow in color. The flowers hang in clusters with male and female flowers on separate trees. The flowers are small with white petals and yellow centers. They are arranged in loose, many-branched hanging clusters, and they appear in summer. The flowers on the female trees develop into bright pink to red berries (1/4 inch in diameter), which are hung in clusters. Each berry contains a hard stone-like seed that requires digestion by birds to germinate. Pepper trees are capable of reproducing readily by the exhaustive seed bank that is formed by mature trees or by a root system that was not systemically eradicated during treatment. Mature rootstocks are capable of regenerating growth for up to three years post herbicide application; therefore, yearly monitoring is required. Additionally, mature trees are resistant to fire and drought. Approximately 1.1 acres of pepper trees were mapped within the Project Area (Figure 3a, b, c, d and Figure 6a, b, c, d). Pepper trees were found in Reaches 5, 6, and 7B.

2.1.3 Scotch broom

Scotch broom is a perennial evergreen in the legume family (Figure 2e). It grows up to 10 feet tall and it has sharply angled branches generally with five green ridges of hairs, primarily during the first three years of growth; as the branches mature, the hairs fall off, and the branches become tan and lose the distinct ridges. There are commonly very few leaves. About half the photosynthetic (green) tissue is in the leaves and half is in branch tissue. However, the lower leaves have three lobes, while the upper leaves are simple. Scotch broom has bright yellow flowers, which are shaped like pea flowers and are about 0.75-inch long. The plants bloom from April to June, forming green seedpods, which contain several seeds. One or two golden yellow pea-like flowers cluster between the leaf base and stem. Scotch broom is a prolific seed producer, requiring monitoring of removal sites to locate and eradicate new seedlings. Location and retreatment of resprouts is also imperative. The site should be examined once a year following initial treatment, when seed germination ends in late spring, for five to ten years. Additionally, Scotch broom resprouts from stumps and the root crown. Approximately 45.5 acres of Scotch broom was mapped within the Project Area and it is found in all reaches except Reach 9 (Figure 3a, b, c, d and Figure 5a, b, c, d).

2.1.4 Salt Cedar

Salt cedar is a many-branched shrub or tree less than 26 feet tall with small scale-like leaves (Figure 2d). Leaves have salt glands, and salt crystals can often be seen on leaves, from which comes the name “salt cedar”. Small white to deep pink flowers are densely arranged on racemes. The bark is reddish brown with smooth stems less than an inch in diameter. Salt cedar is easily spread but difficult to eliminate. Early detection and control are critical, as is seen in Matilija Creek, where little shoots are easily removed or treated, because salt cedar achieves dominance rapidly under favorable conditions. Salt cedar can reproduce both vegetatively and by seed. Plants can regenerate from cuttings that fall on moist soil and quickly generate from seed. Monitoring is essential following any control effort, as some salt cedar is

capable of resprouting following treatment. In addition, seedlings will continue to establish as long as salt cedar infestations persist upwind or upstream of the target area. Less than half an acre of salt cedar was mapped within the Project Area and it was only observed as seedlings in Reaches 7A and 7B (Figure 3a, b, c, d and Figure 6a, b, c, d).

2.1.5 Castor Bean

Castor bean is a perennial shrub, sometimes tree-like, 3 to 15 feet tall, with large, palmately-lobed leaves and sharply-toothed leaf margins (Figure 2e). The leaves are usually deep green, but in some varietals they have a reddish coloration. The stems are smooth, round and frequently red, with clear sap. The flowers are small and greenish, with both male and female flowers on the same plant. The fruit is a quarter-sized, round, spiny capsule, often reddish, containing up to three shiny, smooth, mottled seeds that resemble ticks. Castor bean is a prodigious seed producer and requires monitoring post-removal for several years to locate and eradicate new seedlings. Approximately one acre of castor bean was mapped in the Project Area and is found in relatively low numbers in Reaches 5, 6, 7A and 7B (Figure 3a, b, c, d and Figure 6a, b, c, d).

2.2 Vegetation Communities

Vegetation and habitat types were broadly classified based on eleven categories (Figure 7a, b, c, d). There were seven vegetation types: riparian woodland, riparian scrub, oak woodland, chaparral, scrub, freshwater marsh and grassland; and four unvegetated categories: active channel, developed, open water and roads were identified in the Project Area. The study also included orchards and ornamental vegetation as an initial classification; however, no polygons were classified in these categories within the Project Area. The habitat types were classified using broad definitions combined from Mayer and Laudenslayer (1988), and Holland (1986). These results do not include an approximately 4.5-acre area in the uppermost polygon of Reach 9 which was inaccessible due to a steep waterfall and was not surveyed at the time this report was prepared. The approximate areas of various habitat types within the Project Area are presented below (Table 1).

Table 1: Vegetation Communities within the Project Area

Habitat	Project Area (acres)	Total Acres Infested	Acres of >50% Infestation
Not Sampled	--	--	--
Freshwater Marsh	8.3	0.3	0.0
Grassland	18.5	0.0	0.0
Riparian Scrub	217.9	51.2	30.4
Scrub	154.7	33.4	8.1
Chaparral	259.2	6.3	0.0
Riparian Woodland	247.5	101.3	76.8
Oak Woodland	29.1	8.2	0.0
Open Water	137.3	--	--
Active Channel	191.8	6.3	0.6
Developed	3.1	--	--
Roads	1.9	--	--
Total	**1,274**	**207**	**115.9**

Riparian woodland includes any riparian tree component and tall tree-like shrubs corresponding to the Holland classifications of southern coast live oak (*Quercus agrifolia*) riparian forest , southern cottonwood (*Populus fremontii*) –willow (*Salix* spp.) riparian forest , and southern sycamore (*Plantanus racemosa*) – alder (*Alnus rhombifolia*) riparian woodland. Riparian woodland occurs in 247.5 acres, predominantly in Reaches 6, 7A, 7B, and 9. Approximately 94.5 acres of riparian woodland are infested by the target invasive species, and 76.8 acres are infested at 50 percent or greater, measured by cover.

Riparian scrub is strongly dominated by mule fat (*Baccharis salicifolia*) and includes willows and young sprouts of cottonwood. This early seral stage community is maintained by frequent flooding. Absent this, most areas would succeed to cottonwood- or sycamore-dominated riparian forests or woodlands. Riparian scrub occurs in 217.9 acres and is found in Reaches 5, 6, 7A, 7B, and 8. Approximately 47.7 acres of riparian scrub are infested by the target invasive species, and 30.4 acres are infested at 50 percent or greater, measured by cover.

Oak Woodland is interspersed with non-native grassland and is dominated by coast live oak. It also likely intergrades with oak savannah but was only classified as oak woodland for this study. The vegetation within the Project Area corresponds to the Holland 1986 classification coast live oak woodland. Oak woodland occurs in 29.1 acres, predominantly in Reaches 5 and 7B. Approximately 7.6 acres of oak woodland are infested by the target invasive species, but none of the oak woodland communities surveyed were infested at 50 percent or greater, measured by cover.

Chaparral is dominated by evergreen shrubs with small, thick, leathery, dark green, sclerophyllous leaves. Shrubs are relatively tall and dense and include the Holland 1986 classifications of northern mixed chaparral and chamise (*Adenostoma fasciculatum*) chaparral. Many typical scrub species also grow intermixed as associates as well as several species of ceonothus (*Ceonothus* spp.). Chaparral occurs in 259.3 acres and occurs in all reaches with the highest acreages occurring in Reaches 5, 7B, and 8. Approximately 5.9 acres of chaparral are infested by the target invasive species, but none of the chaparral communities surveyed are infested at 50 percent or greater, measured by cover.

Grassland consists of primarily non-native annual grasses. In the Project Area it was primarily a component of oak woodlands or oak savannah but was occasionally mapped as a separate vegetation community. Grassland occurs in 18.5 acres and was found in Reaches 5 and 7A. No target invasive species are found in this habitat type.

Scrub consists of low, mostly soft-woody shrubs with bare ground underneath and between shrubs. Within the Project Area, this vegetation community included Holland 1986 classifications of Venturan coastal sage scrub and Alluvial scrub. Scrub occurs in 154.7 acres, occurs in all reaches, and predominantly occurs in Reaches 5, 6, and 7B. Approximately 31.1 acres of scrub are infested by the target invasive species, and 8.1 acres are infested at 50 percent or greater, measured by cover.

Freshwater marsh includes emergent vegetation in wet soil habitats or standing water. Within the Project Area, this vegetation type included coastal and valley freshwater marsh. Freshwater marsh occurs in 8.3 acres, with the largest patches occurring above the dam in Reach 7A. A very small acreage, approximately 0.3 acre, of freshwater marsh is infested by the target invasive species, but none of the freshwater marsh communities surveyed are infested at 50 percent or greater, measured by cover.

Active Channel was defined as the barren, often rocky, portion of the channel where water typically flowed during sometime of the year. Throughout the Project Area, 191.8 acres of active channel were mapped. Approximately 5.9 acres of active channel are infested by the target invasive species, and 0.6 acre is infested at 50 percent or greater, measured by cover.

The Project Area also included Developed (3.1 acres), Roads (1.9 acres) and Open water (137.3 acres) areas. Open water is most evident above the dam in Reach 7A and was observed within the creek channel in all reaches, except Reach 5, which was dry at the time of survey.

2.3 Sensitive Species

A habitat suitability assessment was performed for least Bell's vireo, southwestern willow flycatcher and California red-legged frog in all polygons defined during the mapping of the target species infestations in February and March 2007. Habitat assessments were conducted in order to determine where protocol surveys may be required, as well as identifying areas of no or low quality habitat where treatment efforts

might be initiated within the bird breeding season. Criteria for assessing potential habitat were based on specific vegetation characteristics as summarized in Tables 2 and 4 for least Bell's vireo and southwestern willow flycatcher. A habitat assessment was conducted for California red-legged frogs based on USFWS guidance dated August 2005, in appropriate habitat within Reaches 6 through 8.

2.3.1 Least Bell's Vireo

Riparian woodland supporting the least Bell's vireo typically has a dense canopy, where birds forage, and a dense understory, where they nest. The dense riparian habitats usually have a canopy of willow and cottonwood, and an understory comprised of mule fat, poison oak (*Toxicodendron diversilobum*), wild rose (*Rosa californica*), mugwort (*Artemisia douglasiana*), and other riparian species (Franzreb 1989, Olson & Gray 1989, RECON 1989). Least Bell's vireo uses upland scrub adjacent to riparian woodland regularly, foraging at distances up to 200 feet from the riparian edge and even nesting in non-riparian habitat. Use of marginal habitats increases when, after an unusually wet winter, nearby riparian woodland is flooded and the upland habitat becomes unusually lush. Least Bell's vireos nest at openings and edges where there is dense vegetation near the ground, placing the nest between 1.5-5 feet off the ground in a fork of slender twigs of predominantly willows and mulefat (Unitt 1984, Brown 1983). The breeding season generally ranges from March through July. Males establish breeding territories that range in size from 0.5-4 acres (RECON 1989).

A successful nesting pair of least Bell's vireos was recorded in the Ventura River during surveys conducted by Greaves in 2004. This pair was detected near the Main Street Bridge in the vicinity of the Ventura River which is approximately 6.5 miles downstream of Reach 5. Two additional nesting pairs were detected upstream of the main street bridge in 2004 but the status of those nests was not determined. Least Bell's vireos have not been observed in the upper reaches of the watershed or within the project area.

In consultation with the USFWS for the entire Matililja Dam Removal Project (USFWS 2005), it was determined that Project activities were not likely to adversely affect the least Bell's vireo. This determination was based on the limited suitable habitat available for the least Bell's vireo within the Project Area, the presence of brown-headed cowbirds (*Molothrus ater*) within the watershed, and a commitment from the USACE to conduct surveys immediately prior to Project activities within suitable habitat and each year during the breeding season for the duration of the Project. If least Bell's vireo nests are found, Project activities would be set back a minimum of 500 feet from nest sites or avoided until the young have fledged.

The habitat assessment conducted in 2007 identified potential suitable habitat for least Bell's vireo to comply with the USFWS biological opinion for any Project activities that may occur during the breeding season of least Bell's vireo. Table 2 summarizes the criteria used in the least Bell's vireo habitat assessment. The initial treatment of invasive species treatments and/or removal is scheduled to avoid the breeding season of least Bell's vireo.

Table 2: Least Bell's Vireo Habitat Suitability Values

	Vegetation Description	Contiguous Area (acres)	Canopy Height (ft)
Not suitable	Scrub, oak wood, freshwater marsh (without a canopy component)	NA	NA
Poor habitat, low chance to occur	Sparse riparian canopy (open canopy) with passable understory of mule fat (<40% cover) or robust sage scrub following rainy winter	0 - 1	10
Marginal habitat, moderate chance to occur	Canopy of willows or cottonwoods and semi-passable understory of mule fat (50-70% cover); also dense stands of sycamores or alders	0.5 – 3	5 – 60
Favorable habitat, likely to occur	Dense canopy of willows with dense understory of mulefat (70 to 90%), mugwort and wild rose	0.5 – no max.	5 – 40

Potential least Bell's vireo habitat was located in 60.5 acres throughout the Project Area (Figure 8a, b, c, d). The habitat was patchy throughout Reaches 5 through 8; no habitat was observed in Reach 9. The highest quality least Bell's vireo habitat was observed in Reaches 7A and 7B, with 44.1 acres (73%) of suitable habitat within these reaches. Approximately 16.5 acres of potential least Bell's vireo habitat is infested by the target invasive species, and 10.2 acres are infested at 50 percent or greater, measured by cover. Table 3 summarizes the acreages of marginal and favorable habitat determined during habitat assessments.

Table 3: Habitat Suitability Acreages for Least Bell's Vireo

Reach	Marginal Habitat (acres)	Favorable Habitat (acres)	Suitable Habitat with Infestation	Acres of >50% Infestation
5	6.7	0	3	2.3
6	8.3	0	3.9	2.2
7A	11.7	1	4.8	2.6
7B	26	5.5	4.8	3.1
8	1.4	0	0	0
9	0	0	0	0
Total	**54.1**	**6.5**	**16.5**	**10.2**

2.3.2 Southwestern Willow Flycatcher

The southwestern willow flycatcher is a riparian obligate, neotropical migratory insectivore that breeds in summer along rivers, streams and other wetlands where dense willow, cottonwood, salt cedar or other similarly structured riparian vegetation occurs (USFWS 1995a; AGFD 1997e). The willow flycatcher is considered to be a partial cottonwood-willow obligate throughout southwestern riverine systems. It is thought to be restricted to cottonwood-willow habitats at low elevations, but is frequently associated with salt cedar-dominated habitats at higher elevation sites (Hunter et al. 1987). Understory species include mule fat and arrow weed (*Pluchea* sp.). Southwestern willow flycatchers also nest in areas with salt cedar and Russian olive (*Eleagnus angustifolia*) in areas where these species have replaced the native willow. Surface water is required at nesting sites. Both even- and uneven-aged sites are utilized by this subspecies for nesting habitat. Nesting habitat for the willow flycatcher typically has an extensive canopy coverage and is structurally homogenous (USFWS 1995). Occupied habitat is generally associated with surface water and dominated by shrubs and trees 3 to 10 meters (10 to 30 feet) tall that provide dense lower and mid-story vegetation, with small twigs and branches for nesting. Apparently, habitat structure

and the presence of surface water or saturated soils may be more important than plant species composition in defining suitable flycatcher habitat (USFWS 1995).

The willow flycatcher is present and singing on its breeding territory by mid-May, and young are fledged by early to mid-July (USFWS 1995). Territory sizes for the willow flycatcher are not well-known due to the subspecies' rarity and variable habitat utilization. Estimated nesting habitat patch size varies from 0.2 to 1.5 acres. Nests are constructed in densely vegetated thickets with trees between 13 and 23 feet in height (Tibbitts et al. 1994). However, habitat patches as small as 0.5 hectare (1.2 acres) have been found to support one or two nesting pairs (USFWS 1995).

In consultation with the USFWS for the entire Matililja Dam Removal Project (USFWS 2005), it was determined that Project activities were not likely to adversely affect the southwestern willow flycatcher. This determination was based on negative surveys for southwestern willow flycatchers conducted in accordance with USFWS protocol during the 2000 breeding season; an absence of historical records of southwestern willow flycatchers breeding within the study area; and a commitment from the USACE to conduct surveys immediately prior to Project activities within suitable habitat and each year during the breeding season for the duration of the Project. If southwestern willow flycatcher nests are found, Project activities would be set back a minimum of 500 feet from nest sites or avoided until the young have fledged.

The habitat assessment conducted in 2007 identified potential suitable habitat for southwestern willow flycatcher to comply with the USFWS biological opinion for any Project activities that may occur during the breeding season of southwestern willow flycatcher. However, southwestern willow flycatcher has not been observed in the upper reaches of the watershed or the project area. Table 3 summarizes the criteria used in the southwestern willow flycatcher habitat assessment. Currently, invasive species treatment and/or removal is scheduled to avoid the breeding season of southwestern willow flycatcher.

Table 4: Southwestern Willow Flycatcher Habitat Suitability Values

	Vegetation description	Contiguous area (acres)	Canopy height (ft)
Not suitable	Riparian scrub, scrub, oak woodland, freshwater marsh that lacks a closed canopy	NA	NA
Poor habitat, low chance to occur	Sparse/Open riparian canopy (<30% cover) of tree species including willow, cottonwood, alder and maple; no surface water within polygon	NA	< 15
Marginal habitat, moderate chance to occur	Patches of at least 0.5 acres interspersed with riparian scrub, riparian canopy cover 40-60%, open water	0.5 – no max	10 – 30
Favorable habitat, likely to occur	Contiguous, dense stands of willow, cottonwood, alder, maple, w/mulefat understory; surface water present	> 1.0	10 – 30

Approximately 71.1 acres of southwestern willow flycatcher suitable habitat was mapped within the Project Area (Figure 8a, b, c, d). Of the habitat determined suitable 57.7, acres were marginal and 13.5 acres were favorable. Approximately 23 acres of potential southwestern willow flycatcher habitat is infested with the target invasive species, and 16.7 acres are infested at 50 percent or greater, measured by cover. Southwestern willow flycatcher habitat was identified in Reaches 6, 7A and 7B; however, no recent detections of this species are known from the Project Area. Table 5 summarizes the acreages of marginal and favorable habitat determined during habitat assessments.

Table 5: Habitat Suitability Acreages for Southwestern Willow Flycatcher

Reach	Marginal Habitat (acres)	Favorable Habitat (acres)	Suitable Habitat with Infestation	Acres of >50% Infestation
5	0	0	0	0
6	21.1	0	7	2.2
7A	24.8	1.4	15.4	14.5
7B	11.8	12.1	0.6	0
8	0	0	0	0
9	0	0	0	0
Total	**57.7**	**13.5**	**23**	**16.7**

2.3.3 California Red-legged Frog

All life history stages of California red-legged frogs are most likely to be encountered in and around breeding sites, which are known to include coastal lagoons, marshes, springs, permanent and semi-permanent natural ponds, and ponded and backwater portions of streams and artificial impoundments such as stock ponds, irrigation ponds and siltation ponds. California red-legged frog eggs are usually found in ponds or in backwater pools in creeks attached to emergent vegetation such as cattails and bulrush. Creeks and ponds where California red-legged frogs are found most often have dense growths of woody riparian vegetation, especially willows (Hayes and Jennings 1988). California red-legged frogs are also frequently encountered in open grasslands occupying seeps and springs. Such bodies may not be suitable for breeding but may function as foraging habitat or refugia for dispersing frogs. In the summer, California red-legged frogs are often found close to a pond or a deep pool in a creek where emergent vegetation, undercut banks or semi-submerged root balls afford shelter from predators. California red-legged frogs may also take shelter in small mammal burrows and other refugia on the banks up to 100 meters from the water any time of the year and can be encountered in smaller, even ephemeral bodies of water in a variety of upland settings (Jennings and Hayes 1994; USFWS 2002).

California red-legged frogs breed from November through March, with earlier breeding records occurring in southern localities. California red-legged frogs are prolific breeders and typically lay their eggs during, or shortly after, large rainfall events in late winter and early spring. Embryos hatch 6 to 14 days after fertilization and larvae require 3.5 to 7 months to attain metamorphosis.

California red-legged frogs were observed in Reaches 7A and 7B. In the Project Area, California red-legged frogs were observed in giant reed and on rocks, sand, and leaf litter near the creek. Suitable breeding habitat occurs along approximately 10 miles of Matilija Creek in approximately 137.7 acres (Figure 8a, b, c, d). Approximately 14.6 acres of potential California red-legged frog habitat is infested by the target invasive species, and 7.9 acres are infested at 50 percent or greater, measured by cover. The acreage of suitable habitat for California red-legged frog is a very high estimate because the entire habitat within a polygon was included, even if the acreage of pond and adjacent suitable habitat was less. Table 6 summarizes the suitable habitat acreages determined during habitat assessments.

The proposed treatment methodologies described below (Section 3.0) have taken into account the number of California red-legged frogs observed within Reaches 7A and 7B, and have been discussed with the resource agencies.

Table 6: Habitat Suitability Acreages for California red-legged frog

Reach	Suitable Habitat (acres)	Suitable Habitat with Infestation (acres)	Acres of >50% Infestation
5	3.1	0.4	0
6	23.3	7.2	3.3
7A	23.4	5.6	4.6
7B	41.9	1.1	0
8	16.8	0.05	0
9	29.2	0.2	0
Total	**137.7**	**14.55**	**7.9**

3.0 TREATMENT METHODOLOGY

Many techniques are currently utilized in the control and removal of giant reed, Scotch broom, salt cedar, castor bean, and pepper tree. These include mechanical removal, herbicide application, controlled burning and biological control, as well as various combinations of these techniques. The selection of the appropriate removal methodology for this Project was determined with consideration of many variables, including the time of year, severity of infestation, the presence of native plants and wildlife, the degree of intermixing of invasive species with sensitive native habitats, the presence of sensitive native species, access, proximity to surface water, water source, budget, and permitting regulations.

The Matilija Creek and Ventura River reaches vary considerably, not only in terms of physical and ecological characteristics, but also in degree of infestation of invasive species with native species within the same habitat, environmental sensitivity, and access. These factors in turn guide, but not entirely limit, the choice of removal options preferable for a certain reach. For example, the environmental sensitivity of a certain reach may warrant use of more labor-intensive but environmentally sensitive techniques (e.g., cut and daub) and limit the widespread use of more intrusive techniques (e.g., mechanical clearing). However, sub-sections of this reach may be less sensitive and warrant consideration of mechanical clearing or other more invasive approaches. Based on the sensitive species issues, access, and discussions with the resource agencies, the main treatment methodologies proposed under this Plan include foliar spray, cut and daub, cut and spray, basal bark treatment, and non-herbicide methodologies. Regardless of the technique selected, all method options are accompanied by a list of Best Management Practices, or BMPs (Section 5.0).

3.1 Herbicides

Herbicides are chemicals that kill plants or stunt their growth. Some herbicides are selective (clopyralid, for example, is used to kill yellow star-thistle (*Centaurea solstitialis*) without harming grasses and most other forbs), while others are more general. Herbicides can be applied in many ways at many scales, from aerial spraying over large infestations to discrete brushing on individual plants. The U.S. Environmental Protection Agency (USEPA) and the California Department of Pesticide Regulation (CDPR) must register the herbicides prior to their use in California. Furthermore, the large-scale application of herbicides must be overseen by a licensed professional. Liability concerns and State laws and regulations limit the unsupervised use of herbicides; the contractor scoped to perform the work in the Project Area will require a licensed Qualified Applicator (QAL) on staff, as well as qualified applicators with their Qualified Applicators Certificate (QAC) on site during application. The QAL is required to document herbicide usage and know all State and local regulations.

Herbicides currently available for application on the target species are limited due to label restrictions and efficacy. However, application of herbicides can be one of the most effective tools for control and eradication of these invasive plants. Herbicides are effective when used alone to control infestations, but are often used in conjunction with other techniques such as cutting or mowing. The use of herbicides can substantially increase mortality rates of persistent invasive plants, reducing the need for invasive hand or

mechanical excavation of roots and rhizomes and associated soil disturbances. However, the utility of herbicide application to control these target species can be affected by its relatively high initial cost, restrictions on use in proximity to water, the degree of intermixing of invasive plants with natives and the presence of sensitive species. These factors can all restrict the type of herbicide allowed, the location and timing of use and the method of application.

A successful herbicide application as a means of control depends primarily upon selecting the appropriate herbicide for the task and adhering to label requirements. Many herbicides are prohibited for use around open water and all may exhibit seasonal variations in effectiveness. The most effective method of application can vary between brands and types of herbicides. Most herbicides require the use of a surfactant, which may be included in the product or added prior to application to increase effectiveness. Colorants are also often added to herbicide solutions to enable spray crews to see where they have sprayed after initial evaporation of the solution.

The herbicides commonly utilized for eradication for the listed target species within California are glyphosate (Round-up®, Aquamaster®), triclopyr (Garlon 3A®, Garlon 4®), and imazapyr (Habitat®). Formulations of glyphosate, triclopyr, and imazapyr for use near aquatic habitats are available under various brand names.

3.1.1 Glyphosate

Glyphosate is a broad-spectrum, non-selective systemic herbicide. Glyphosate can be used to treat all the target species, but the effectiveness on Scotch broom, pepper tree and salt cedar is lower than with the other selected herbicides. The USEPA and USFWS have approved Rodeo® and Aquamaster® for use in aquatic environments, making glyphosate the primary herbicide currently available for use throughout the Matilija Creek and Ventura River work areas. Roundup® is only approved for use in areas where water is not present. Glyphosate is most effective when used on perennial plants, such as giant reed and castor bean, when applied in the late summer and fall when the plant is entering dormancy; this permits transmission of the herbicide to the plant's root system (Sonoma Ecology Center 1999). Glyphosate is not effective for pepper trees and Scotch broom.

Glyphosate is usually formulated as an isopropylamine salt. While it can be described as an organophosphorus compound, glyphosate is not an organophosphate ester but a phosphanoglycine, and it does not inhibit cholinesterase activity. Glyphosate is moderately toxic to fish. In rainbow trout, for instance, the 96-hour LC50[1] is 86 mg/l, in bluegill sunfish the LC50 is 120 mg/l, and in harlequin the LC50 is 168 mg/l. An additive used in the Roundup® formulation (modified tallow amine used as a surfactant) is more toxic to fish than many common surfactants. For this reason, the formulation for use in aquatic situations (Aquamaster®) omits this ingredient. The surfactant is used to allow the glyphosate to readily dissolve in solution and keep it balling up on the leaf surface. There is a very low potential for glyphosate to build up in the tissues of aquatic invertebrates or other aquatic organisms. Glyphosate has very little chance of being leached into the groundwater table due to its strong adsorption to soil particles, including soil structure with low organic material and low clay content. The half-life of glyphosate ranges from 1 to 174 days.

3.1.2 Imazapyr

Imazapyr is a broad-spectrum imidazolinone herbicide used to control grasses, broadleaves, vines, brambles, brush and trees. Imazapyr, as Habitat®, can also be used to treat giant reed, salt cedar, pepper tree, castor bean and Scotch broom. Imazapyr is the active ingredient in Habitat®, an aquatic habitat formulation that allows for use within areas with surface water. Imazapyr is not designated to be used within Matilija Creek and Ventura River channels except for isolated application on pepper tree and

[1] LC50 refers to the lethal concentration of a chemical that kills 50 percent of test animals in a given time period.

Scotch broom stumps and bark that are within the floodplain but away from open water. Similarly, imazapyr will only be used for foliar application of Scotch broom outside of USACE jurisdictional areas.

Imazapyr works by disrupting an enzyme (found only in plants) necessary for protein synthesis and interfering with cell growth and DNA synthesis in plants. The isopropylamine salt of imazapyr is the only active ingredient (28.7%) in the herbicide Habitat®. Moreover, Habitat® is labeled for use in aquatic environments. The effects of imazapyr on fish based on product registrant studies with technical grade imazapyr using a standard 96-hr exposure studies report acute toxicity LC50 concentration for rainbow trout, bluegill sunfish and channel catfish is >100 mg/L. On these bases, imazapyr would be characterized as non-toxic to slightly toxic to fish, with a low potential for leaching into groundwater. Unlike glyphosate, there is the potential to damage adjacent non-target plants by transfer between root networks. Cut and daub or basal bark treatment is preferred over foliar application in areas surrounded by native vegetation.

3.1.3 Triclopyr

Triclopyr can be used to treat salt cedar, pepper tree, and Scotch broom and is a selective systemic herbicide. It has little or no impact on grasses (i.e., giant reed). Triclopyr is the active ingredient in Garlon® and Pathfinder® formulations. Garlon 4® and Pathfinder II® are approved for terrestrial habitats. Garlon 3A® is approved for use in closed aquatic habitats such as wetlands and lakes. It is not allowed for use on streams and rivers. Triclopyr will only be used for foliar application of Scotch broom outside of USACE jurisdictional areas. Isolated application is anticipated on pepper tree and Scotch broom stumps and bark that are within the floodplain but away from open water.

Triclopyr, a pyridine, is a selective systemic herbicide used for control of woody and broadleaf plants along rights-of-way, in forests, on industrial lands and on grasslands. Garlon 4® is the most common triclopyr, which is considered slightly toxic to highly toxic to fish depending on the formulation. Triclopyr and its amine salt formulation has a 96-hour LC50 of 117 mg/L for rainbow trout and 148 mg/L for bluegill sunfish. While Triclopyr in the ester formulation has a 96-hour LC50 of 0.74 mg/L for rainbow trout and 0.87 mg/L for bluegill sunfish.

In natural soil and in aquatic environments, triclopyr (amine salt formulation) is rapidly converted to an acid, which in turn is neutralized to a salt. This salt is quickly degraded in the environment. However, triclopyr is not strongly adsorbed to soil particles, leaving the potential to contaminate surface water through run-off. Triclopyr should not be applied within twenty-four hours of potential rain events. Triclopyr leaves little residual chemical if proper label directions are followed because it is strongly translocated by roots and leaves upon application.

3.1.4 Adjuvants

Adjuvants and surfactants are spray solution additives, and are considered any product added to an herbicide solution to improve the performance of the spray mixture. Examples of adjuvants include compatibility agents (used to aid mixing two or more herbicides in a common spray solution), drift retardants (used to decrease the potential for herbicide drift), suspension aids (used to aid mixing and suspending herbicide formulations in solution), spray buffers (used to change the spray solution acidity) surfactants, and spray colorants (dyes).

Surfactants (surface active agents) are a type of adjuvant designed to improve the dispersing/emulsifying, absorbing, spreading, sticking and/or pest-penetrating properties of the spray mixture. Pure water will stand as a droplet, with a small area of contact with the waxy leaf surface. Water droplets containing a surfactant will spread in a thin layer over a waxy leaf surface. Because post-emergence herbicide effectiveness is greatly influenced by plant factors such as age, size and the growing conditions encountered before application, herbicide performance can vary. A way to minimize the variations in post-emergence herbicide performance is to use an adjuvant or surfactant in the spray solution. Adjuvants, specifically surfactants, generally improve the effectiveness of post-emergence herbicides.

The surfactants listed below are approved for use by the USFWS within the Matilija Creek and Ventura River systems.

Nonionic surfactants, as Agri-dex or LI-700, are comprised of linear or nonyl-phenol alcohols and/or fatty acids. This class of surfactant reduces surface tension and improves spreading, sticking and herbicide uptake. Herbicide applicators should check the label prior to adding surfactant for proper dilution rates.

Spray colorants are non-toxic dyes used to better visualize pesticide spray and prevent over application of pesticide in one area. The most common colors to use are either blue or green; the colorant is required to be mixed prior to application directly in the mixing tank. All colorants should be mixed properly using label directions.

3.2 Herbicide Application for Target Species

There are four common techniques that can be used to eradicate the target species found in the Matilija Creek and Ventura River systems: foliar spray, cut and daub, cut and spray, and basal bark treatment. Specific techniques should be utilized depending on the situation present on site (i.e. steep cliffs, open water, near roads, private residences, etc.). Specifically, the cut and daub method is required within 200 feet of private residences. Species specific treatments are listed below.

3.2.1 Giant Reed

Foliar Spray. The most common herbicidal treatment to control giant reed is glyphosate, primarily in the form of Aquamaster®, which is approved for use near open water. Glyphosate is a broad-spectrum herbicide; therefore, care should be taken to avoid application or drift onto native vegetation. The recommended treatment is a foliar spray application of 6-8 % by volume glyphosate with a 0.5% non-ionic surfactant. Application rates vary by situation; however, any changes to the listed percentages should be in consultation with a Pest Control Advisor (PCA). The most effective application is post-flowering and pre-dormancy, usually late August to early November when plants are translocating nutrients into the root system and rhizomes. Foliar uptake and eradication may be achieved by spray application during active growth periods, primarily late spring through early fall (Monsanto 1992). It may take up to four months for herbicide to translocate throughout the entire system. An herbicide colorant, such as Blaz-on®, shall be applied to the mixture to distinguish treated versus non-treated areas, use label recommendations for mixing percentage. Foliar application of glyphosate is the preferred method for retreatment of all regrowth.

Around open water, in potential California red-legged frog habitat, care will be taken to lean the giant reed away from open water in order to minimize overspray on the water.

Cut and Daub. Direct treatment to cut culms can reduce herbicide costs and avoid drift onto desirable plants, with fair results year-round and best kill rate in fall. Concentrated glyphosate solution (50 to 75% Aquamaster®, or 27 to 40% glyphosate) is applied directly to stems, cut within two to four inches (5 to 10 cm) of the substrate, by painting with a cloth-covered wand or a sponge or spraying with a backpack mister. A colorant, such as Blaz-on® must be added to solution to identify treated material. Solution must be applied immediately following cutting because translocation ceases within minutes of cutting; a three-minute maximum interval is suggested (TNC 1996). When using this approach precautionary measures must be taken to dispose of the live, green material in an appropriate disposal area outside of the creek channel. This method is recommended adjacent to residential development and orchards to reduce the risk of overspray.

Cut and Spray. New growth is sensitive to herbicides, so a common alternative is to cut or mow a patch of giant reed and allow regeneration, returning three weeks to three months later when plants are 3 to 6 feet (1 to 2 meters) tall to treat new growth by foliar spraying of a 6-8 percent glyphosate solution. Promoting regrowth causes nutrients to be drawn from the roots, potentially reducing the movement of glyphosate to the roots (TNC 1996). When using this approach precautionary measures must be taken to

dispose of the live, green material in an appropriate disposal area outside of the creek channel. Cut and spray has not proven as effective as the other two methods and should only be employed when necessary.

3.2.2 Scotch broom

Foliar Spray. To eradicate mature Scotch broom plants, it must be foliar sprayed until wet with 5-6% glyphosate. Application rates vary by situation; and changes to the listed percentages should be in consultation with a PCA. The addition of an approved surfactant will improve effectiveness. However, the foliar spray may impact non-target species if proper discretion is not taken to prevent drift. Foliar application should be utilized during periods of active growth after flower formation. Chemical removal alone results in standing dead biomass that makes monitoring for and treatment of broom seedlings difficult. The standing dead biomass also presents a fire hazard. If large stands are present then it is recommended to remove dead biomass. Biomass shall be removed no less than four weeks after treatment to allow time for effective translocation of chemical to root system. An herbicide colorant, such as Blaz-on®, shall be applied to the mixture to distinguish treated versus non-treated areas, using label recommendations for mixing percentage. Foliar application of glyphosate is the preferred method for retreatment of all seedlings and for infestations that occur near open water.

Cut and Daub. This method entails cutting the shrub off near the ground (cut and daub method) and applying 100% triclopyr, as Garlon 4®. This technique usually results in better than an 85% kill rate. Garlon 4® has no timing restrictions and may be used year round. The cut and daub method is appropriate for retreatment of large shrubs. This method is recommended in upland areas surrounded by native vegetation.

Basal Bark Treatment. Another effective technique includes the use of triclopyr, as Garlon 4®, in 25% solution, applied with a wick in low volume (2-3 drops) to basal bark. This application technique does not affect non-target species, but it is more time-consuming and may be impractical for large infestations. This technique should be under taken in stands that number less than ten trees per acre in upland areas away from water. Additionally, basal bark treatment should be used during periods of active growth after flower formation.

3.2.3 Salt cedar

Foliar Spray. The most cost-effective method for eradicating salt cedar is to apply imazapyr, as Habitat®, to the foliage in a 5% solution. This technique is especially effective when a tank mix is used with a glyphosate herbicide at a 2% solution. Foliar applications of this combination achieve best results when applied in late spring to early fall during good growing conditions. Foliar application of a 5% imazapyr/2% glyphosate with backpack sprayers is the preferred method for retreatment of all resprouts. This combination of aquatic herbicides is appropriate for use near open water and is preferred for use on small individuals.

Cut and Daub. The most frequently used method in California is to cut the shrub off near the ground and apply 100% triclopyr, as either Garlon 4® or Garlon 3A®. This technique usually results in better than a 90% kill rate. Garlon 4® has no timing restrictions, but Garlon 3A® should be applied during the growing season. This method is appropriate if large trees are encountered away from open water. Removal of biomass is not necessary as no large shrubs were located within Matilija Creek or the Ventura River Project Area.

Basal Bark Treatment. Triclopyr, as Pathfinder II®, can be applied directly to the basal bark of stems less than about four inches in diameter without cutting the stem (the bark must be wetted completely around the base of each stem). Triclopyr can be diluted with diesel or natural oils. A dilution of three parts water to one part of Garlon 4® is proven effective. This method is appropriate if large trees are encountered away from open water. Removal of biomass is not necessary as no large shrubs were located within Matilija Creek or the Ventura River Project Areas.

3.2.4 Pepper tree

Foliar Spray. Foliar herbicides are the fastest acting with the least residual activity, although their probability of success is relatively low. Foliar herbicides that have been used with some success include 15% triclopyr, as Garlon 3A®, diluted with water or diesel and 2% triclopyr, as Garlon 4®, diluted with water. All of these herbicides are most effective when applied to seedlings, and are only appropriate for infestations away from water.

Cut and Daub. Tree crews should cut the tree off near the ground (no more than 12 inches) and the stumps should be treated with a tree stump disintegrator or stump killer. This technique usually results in better than a 90% kill rate. Removal of biomass may be required if large trees are blocking access; however, due to the dispersed nature and low density of pepper tree within the Matilija Creek and the Ventura River Project Areas no removal is recommended. A treatment using the cut and daub method is the preferred method for regrowth.

Basal Bark Treatment. Successful treatments for full-sized plants include basal bark treatments. Triclopyr, as Pathfinder II®, can be applied directly to the basal bark of stems less than about four inches in diameter without cutting the stem (the bark must be wetted completely around the base of each stem). For widely scattered plants, where access to the main stem is difficult, basal spot treatments are easily applied and effective. This technique is selective, so nearby vegetation is not harmed. Precautionary measures should be taken to contain herbicide on bark, not allowing run-off to reach soil. This method is only appropriate in remote areas away from open water where there are no fire issues or equipment access.

3.2.5 Castor bean

Foliar spray. To remove mature castor bean shrubs, it must be foliar sprayed until wet with 4% glyphosate. The addition of an approved surfactant will improve effectiveness. However, the foliar spray may impact non-target species if proper discretion is not taken to prevent drift. The most effective application is post-flowering and pre-dormancy, usually late August to early November when plants are translocating nutrients into the root system. Foliar application of glyphosate is the preferred method for retreatment of all seedlings.

Cut and Daub. Cut and daub treatment with loppers or saws and 25% glyphosate can also be used to kill mature shrubs, eliminating collateral damage to non-target species and reducing herbicide introduced to the system, especially if the plant is large. Small saws (hand or chain) will be required for larger plants.

3.3 Non-herbicidal Removal Techniques

The following removal techniques will be used on properties where herbicide use has not been authorized. The non-herbicide control techniques available are tarping and repeated cutting.

Tarping. Tarping involves cutting the giant reed to the ground (4 inches above ground), removing the biomass, and placing a secure opaque tarp over the cut stems. This method prevents the plant from photosynthesizing, thereby killing the plant. The tarp must be secured to the ground, as any light will allow giant reed to resprout as it has a high shade tolerance.

Cutting. Repeated cutting requires that the all growth and subsequent regrowth is cut and removed off site. The repeated cutting of plant material theoretically depletes the plant reserves and will ultimately cause the plant to die. There is no data available on how many cutting events are required to kill a plant, but it may take up to several years depending on the age and size of the individual. Cutting should occur when regrowth is roughly 2 feet tall. Plant material that is taller may photosynthesize and direct photosynthate back to the roots.

3.4 Biomass Removal

The biomass or plant material can be treated several different ways depending on whether the biomass is alive or dead. In addition, factors such as equipment access, presence of sensitive species, and the risk of wildfire determine what method is appropriate in a given area. All cut biomass for species other than giant reed will be taken to the landfills as destruction loads. For this Project, areas with dead giant reed biomass will be left in place. Once killed, much of the standing biomass of giant reed will fall to the ground, with only the older, larger canes remaining. A significant amount of material drops to the ground thereby reducing the standing biomass and significantly reducing the fire hazard in comparison to the dense, green stands. Giant reed may be chipped and used as landscape mulch or left on the site in thin layers. Giant reed biomass will also be left in place because it provides cover for California red-legged frog and in some areas the channel is too steep and narrow that the time and impacts associated with removal outweigh the benefits. This method is preferred for all arundo outside of 200 feet of the buffer area. The following section describes in detail specific parameters for chipping, mowing, and incinerating the biomass.

3.4.1 Chipping

Chipping is a common practice to reduce the amount of biomass. The felled biomass shall be chipped immediately using suitable chipping equipment, including portable twelve inch wood chippers. Other types of equipment may be available. Material will be chipped to a size less than 4 inches. For all live, green biomass, the material will be chipped adjacent to the riverbed, in an approved staging area, directly into single bed dump trucks and transported off site to be properly disposed. Dead biomass, which has been foliar sprayed and allowed at least four months to translocate the herbicide, may be chipped and left on-site to degrade. Four-inch pieces of giant reed spread evenly along the site no higher than 2 feet will often degrade over several months. Large chippers will be located at the staging areas and at wide areas within the channel. In areas where it is not feasible to tow the chipper into the channel, the cut material will be hauled to a more remote location prior to chipping or smaller more portable equipment may be utilized. Potential cutting areas will be determined prior to the biomass removal. In areas where removal is not possible and access limits hand equipment use, a possible alternative will be to chip dead biomass using bladed weed-eaters and leave on site. This is the preferred method to be used within the 200 feet buffer area.

3.4.2 Incineration

The optimal and most cost-effective solution to live, green biomass removal within the Project Area is to incinerate the biomass on site in sections as large as practical in an S-Series Air Curtain Burner without prior chipping. Incineration is not an option once the material has been sprayed with herbicide. An S-Series machine is a portable refractory walled incineration system or mechanized burner with a firebox that is usually 21 or 27 feet long, capable of accommodating large amounts of biomass at one time, upwards of ten tons per hour (throughput is dependent upon the type of system used and factors, such as make-up and moisture content of waste stream, etc.) However, this process is the most efficient and economical of the methods described in this section, with the exception of leaving standing biomass on site. The incinerator could be brought into strategic locations, to be determined prior to removal effort, and biomass would be delivered to the machine for incineration. This will require minimal disposal of material. In addition, the incinerators should be tested for air quality compliance prior to being delivered. Necessary fire control equipment (e.g., extinguishers, water hoses, etc.) should be on hand to prevent any unintended spread of the fire.

3.4.3 Mowing

Mowing is carried out in place using a hammer-flail mowing attachment that is mounted on the front of a rubber-tired tractor. Alternatively, slope mowers, Hydroax, and other mowing devices can be used (not all are rubber-tired). Generally, all these devices work very well on relatively flat, even terrain; the more

difficult terrain present in the channel may not be suitable for this type of operation. Some newer machines are articulated, allowing them to maneuver over uneven terrain. Mowing is generally best suited for dense giant reed stands that have been foliar sprayed and left in place for four months to translocate the herbicide. Mowing green material is not appropriate because it promotes the dispersal of giant reed down stream. If the stands are very old and dense, it may be hard to maneuver through them and there may be hidden obstacles (i.e., boulders) or unexpected drops. Native vegetation can be avoided as long as it is not too intermixed with the giant reed. Mowing dead cane is much easier and produces finely mulched material. The operator can move back and forth over an area to mulch the material finer.

Mowing is advantageous because no biomass has to be moved by hand or moved off site. The limitations to mowing include site access, terrain, amount of native vegetation, and noise issues Isolated patches in Reaches 5 and 6 may be mowed if biomass removal is required at a later date.

3.5 Access

Due to the undeveloped nature of the Matilija Creek and Ventura River Project Areas, managing access throughout the removal effort will require a strategy that includes the expansion of access roads, the developing of staging areas, and the monitoring of traffic flow. The ability to access regions within each reach can be hampered by steep cliffs, private property, river crossings, large bodies of water and other obstacles. Six potential access roads have been located to facilitate access and are included in Figure 9.

General access to the Project site and staging areas will be by way of the following roads: Highway 33, Highway 150, Rice Road, Matilija Hot Springs Road, Camino Cielo, and Matilija Canyon Road. Additonal access will be gained by several private roads, including Casitas Water District roads orchard owners' frontage roads, private ranch roads in the northern sections. Several trips both in and out of each staging area will be required by the following equipment: water trucks, spray rigs, storage facilities and roll-off dump bins. Daily trips will be made to each staging area by personal vehicles and pick-up trucks.

Matilija Canyon Road and Highway 33 will be the main route to access staging areas in the northern reaches (9b, c, d), while Rice Road and Highway 150 will access the southern staging areas (9a). Camino Cielo, Matilija Hot Springs Road, and the several private roads will be utilized to access areas adjacent to the designated state highways and city roads. Proposed access roads will aid in reaching the channel (Figure 9). Signage will be posted on the main road to warn drivers, bicyclists and hikers of equipment crossings. The signs shall be posted approximately 100 feet north and south of the access pathways. All signs shall be posted at least one week prior to use for crossing and shall be maintained for the entire period during which crossings will occur. Vehicles using the access roads for entrance into the staging area will do so one at a time to prevent any damage to the native surroundings. Use of the staging area by the crew will not impede traffic along any thoroughfare. Some access areas are closed off to the public by locked gates. Before leaving each day, the crew will ensure that the gate is locked and completely secure.

Multiple staging areas along both sides of the river will be maintained adjacent to the work sites. The selection of each staging area is based on available space, ease of access to the staging area, ease of access between eradication site and the staging area, and avoidance of impacts to any sensitive species. Permission for use of each staging area will be coordinated with the appropriate landowner.

Each staging area is approximately one-eighth to one-half acre in size and will be used for temporary storage of equipment, including handheld equipment, roll-off dump bins, employee vehicle parking, portable sanitation and temporary storage of removed biomass.

In some areas, proposed access roads may need to be developed to allow for immediate access into the work area.

These roads will be for equipment transport (i.e., water truck, spray rig, chipper, etc.) and vehicular access of pesticide application equipment. Six proposed access roads are identified for the Project

(Figure 9a, b, c, d). Upon completion of the particular reach, all changes to the channel will be replaced and the access road disturbance areas will be restored to near the pre-Project condition.

4.0 SUMMARY BY REACH

The following reach summaries describe the target species infestation, sensitive species habitat, and access and logistical options and constraints. The acreages of suitable habitat for sensitive species are overestimated. When suitable habitat was identified for sensitive species the entire polygon was considered suitable. Based on this information, one or several methodologies are proposed for each reach. The approach outlined below is only a guideline; the contractor will be responsible for using the best professional judgment in accordance with the guidelines and associated BMPs. All invasive species are to be treated within each reach and no one technique is capable of completing an entire reach. A combination of removal methods and herbicide application techniques will be required.

4.1 Reach 5

Description
Reach 5 begins where the Highway 150 Bridge crosses the Ventura River and extends approximately 3.3 river miles upstream, ending just upstream of the Robles Diversion Facilities (Figure 3a). This reach is adjacent to the communities of Meiners Oaks, Rancho Matilija and Mira Monte. The entire reach encompasses 558 acres within a broad floodplain. The Ojai Valley Land Conservancy manages most of the acreage within the Project Area of Reach 5 as part of the Rancho El Nido Preserve. Private residences and orchards occur on both sides of the southern end and eastern portions of this reach outside of the Project Area. The Rancho El Nido Preserve and the Los Padres National Forest occur adjacent to the Project Area on the northwestern side of Reach 5.

The channel within this reach is generally low-gradient, shallow, cobbly, relatively open and increasingly braided as it continues downstream. Most of this reach was dry during surveys in January and February; however, there was perennial water near the Robles Diversion Facility. There are flood terraces of varying elevations supporting primarily upland vegetation communities. The most stabilized terraces comprise oak woodlands (138 acres, or 24% of reach); riparian woodlands (18 acres, or 3%); and chaparral (57 acres, or 10%). The semi-stabilized terraces supported a combination of scrub (169 acres, or 30%); riparian scrub (80 acres, or 14%); and grassland (18 acres, or 3%). Isolated islands of upland vegetation are common in this reach, especially in the downstream portion, where the channel is increasingly braided. Approximately 74 acres (or 13%) of the reach are classified as active channel. Freshwater marsh (2.2 acres, or 0.4%) and a developed area (1 acre, or 0.13%) are mapped at the Robles Diversion Facility. Habitat types are summarized in Table 7 below, which also includes acreages of infestation of all target invasive species.

Table 7: Habitat Types and Acreages in Reach 5

Habitat	Project Area (acres)	Acres of Infestation	Acres of >50% Infestation
Active Channel	74.3	2.9	0
Chaparral	57.4	1.8	0
Developed	0.7	0	0
Freshwater Marsh	2.2	0	0
Grassland	17.8	0	0
Oak Woodland	138.3	3.7	0
Riparian Scrub	79.8	26.2	13.3
Riparian Woodland	18.1	3.9	2.5
Scrub	169.4	18.8	2.7
Open Water	0.3	Na	0
Total	**558.0**	**57.3**	**18.5**

Sensitive Species

Approximately 7 acres of marginal least Bell's vireo breeding habitat was identified during field assessments, of which approximately 3 acres is infested by target invasive species (Figure 8a). No habitat was identified for southwestern willow flycatcher within this reach. Approximately 3 acres of habitat was identified as suitable for California red-legged frogs, although no call or individuals were observed during field assessments (Figure 8a). Of the 3 acres identified, 0.4 acre is infested by target invasive species. Marginal and suitable habitat acreages for sensitive species and acreages of infestation for all target invasive species in Reach 5 are presented in Table 8.

Table 8: Habitat Suitability for Sensitive Species in Reach 5

Sensitive Species	Marginal and Suitable Habitat (acres)	Acres of Infestation	Acres of >50% Infestation
Least Bell's vireo	6.7	3	2.3
Southwestern willow flycatcher	0	0	0
California red-legged frog	3.1	0.4	0

Treatment

Reach 5 is the least complicated reach to perform removal because it is the most accessible and has the fewest dense stands and the fewest sensitive species issues. Field assessments estimated giant reed acreage at 34 acres and Scotch broom at 30 acres. Isolated individuals of castor bean and pepper tree were recorded, resulting in 0.37 acres and 0.7 acres, respectively. No salt cedar was identified in this reach. These infestations occur in approximately 3.9 acres of riparian woodland, 3.7 acres of oak woodland, 26.2 acres of riparian scrub, 18.8 acres of riparian scrub, 1.8 acres of chaparral, and 2.9 acres of active channel.

Giant reed, Scotch broom, and castor bean will be treated by foliar herbicide application with glyphosate and all dead material will be left in place. To reduce fire hazards, stands within 200 feet of private residences will need to be treated with the cut and daub method and biomass chipped off site. Pepper trees will be cut and the stump treated with triclopyr or imazapyr. The remaining tree biomass, if within 200 feet of residences, will be chipped off site.

The overall access to Reach 5 will be from the southern or northern extremes of the reach. There are staging areas at both the north and south ends of the reach and access can be gained through the day use facility parking area to the north of Highway 33 (Fig 9a). Access at the south end of the reach, near Highway 150, will require construction of an access road in the channel. Staging in the northern area will

be at a Casitas Water District facility. The staging facilities are both large enough for a moderate amount of equipment; additional storage may be available at the Ventura County River Water District. Both noted staging areas have locked gates. Once within the reach, the entire reach can be accessed by All Terrain Vehicles (ATV) with mounted 50-gallon spray rigs. These vehicles are capable of traversing the numerous trails throughout the reach. Due to the large area of the reach, foot traffic to each individual stand is not cost effective.

There are water sources (i.e., hydrants) at several locations, including the Casitas Water District facility at the northern end of the reach and at the Ventura County Water District facility at the southern end. A primary concern in this reach is the lack of direct access to the middle section and the high concentration of private stakeholders, which creates a blockade to access routes. Access via the frontage road (Casitas Water District) on the west side will be required.

Table 9: Reach 5 Treatment Summary

Target Species	Recommended Treatment Methods	Herbicide/Surfactant Concentration	Biomass Removal Technique	Staging No.	Issues
Giant reed	Foliar Spray (backpack, ATV spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant;	Leave in place	S1, S2, S3, S4	Access roads required
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S1, S2, S3, S4	
Scotch broom	Foliar Spray (backpack, ATV spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant	Leave in place	S1, S2, S3, S4	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S1, S2, S3, S4	
Pepper tree	Cut/Daub	100% imazapyr/triclopyr	200 ft. buffer/chipped off site	S1, S2, S3, S4	
Castor bean	Foliar Spray (backpack, ATV spray rigs	5% glyphosate, 5 fl. oz./100 gallons of surfactant	Leave in place	S1, S2, S3, S4	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S1, S2, S3, S4	

4.2 Reach 6

Description

Reach 6 begins on the Ventura River upstream of the Robles Diversion Facility and extends 2.1 river miles upstream following the Matilija Creek branch and ending at the Matilija Reservoir Dam. The North Fork of Matilija Creek meets Matilija Creek and becomes the Ventura River in the northern portion of this reach. This reach is just north of the community of Meiners Oaks and encompasses approximately 95 acres. The channel becomes increasingly more defined and narrow as it continues upstream from Reach 5 and changes from ephemeral to perennially flowing water. The canyon immediately below the Matilija Reservoir Dam is steep-sided and the channel is restricted and narrow. Large boulders form pools within the upper portions of this reach. Private residences and orchards border the lower portions of the reach on the east and west sides, and one small hotel resort is located near the dam.

The upper portion of this reach is dominated by riparian woodland, comprising 40 acres (or 42%) of the reach. Oak woodlands are the second-most prevalent habitat type in this reach comprising approximately 17 acres or 18% of the reach. Riparian scrub occupies roughly 8 acres (or 8%) of the reach; scrub occupies 18 acres (or 19%) of the reach; and chaparral occupies 7 acres (or 7%) of the reach. The active channel occupies 1.6 acres (or 1.6%) of the reach and developed areas and roads comprise 1.5 acres each, or roughly 1.6% each. Habitat types are presented in Table 10 below which also includes acreages of infestation of all target invasive species.

Table 10: Habitat Types and Acreages in Reach 6

Habitat	Project Area (acres)	Acres of Infestation	Acres of >50% Infestation
Active Channel	1.6	0.1	0
Chaparral	7.0	1.3	0
Developed	1.5	0.1	0
Oak Woodland	16.9	0.3	0
Roads	1.5	0.1	0
Riparian Scrub	8.0	3.2	2.3
Riparian Woodland	40.2	14.2	5.9
Scrub	18.2	5	3.2
Total	**94.8**	**24.3**	**11.4**

Sensitive Species

Approximately 8 acres of marginal least Bell's vireo habitat (4 acres of which are infested by target invasive species) and 21 acres of marginal southwestern willow flycatcher breeding habitat (7 acres of which were infested by target invasive species) were identified during field assessments (Figure 7b and 8b). Approximately 23 acres of suitable California red-legged frog habitat was identified (7 acres of which are infested by target invasive species) and calls were heard below the dam (Figure 9b). The acreage of suitable habitat for California red-legged frog is a very high estimate because the entire habitat within a polygon was included, even if the acreage of pond and adjacent suitable habitat was less. Marginal and suitable habitat acreages for sensitive species and acreages of infestation for all target invasive species in Reach 6 are presented in Table 11.

Table 11: Suitable Habitat for Sensitive Species in Reach 6

Sensitive Species	Marginal and Suitable Habitat (acres)	Acres of Infestation	Acres of >50% Infestation
Least Bell's vireo	8.3	3.9	2.2
Southwestern willow flycatcher	21.1	7.1	2.2
California red-legged frog	23.3	7.2	3.3

Treatment

The primary target species in this area is giant reed, which is growing in large dense stands. Field surveys estimated 20.5 acres for giant reed infestation and 4 acres for Scotch broom. Very few pepper trees were found (0.35 acres). Castor bean individuals were found in scattered locations (0.5 acres). No salt cedar individuals were identified from this reach. These infestations occur in approximately 14.2 acres of riparian woodland, 0.3 acre of oak woodland, 3.2 acres of riparian scrub, 5 acres of scrub, 1.3 acres of chaparral, 0.1 acre of active channel, and approximately 0.2 acre of roads and developed areas.

This reach was separated into two sub-reaches due to access (Figure 9b). Reach 6a is easily accessible via the private frontage road through the orchards. There is one privately owned staging area located

within this reach, which is located along Highway 33 at 15145 Matilija Canyon Road, near the bridge. Staging can also be gained via the northern Reach 5 staging area. Access across the river is via Camino Cielo. There are water sources (i.e., hydrants) at several locations located along the road in the private areas.

Most of the stands of giant reed and castor bean in Reach 6A will be treated by foliar herbicide application with spray rigs stationed along either side of the road with extended hoses (>300 feet) for application. Foliar treatment within fifteen feet of pools where California red-legged frog populations are located will be performed by pulling stands away from pool prior to application, taking care not to trample banks. The biomass more than 200 feet from private residences will remain left in place, all stands within 200 feet will need to be treated by the cut and daub method. Cut and daub will also be used in this reach because much of the giant reed infestation occurs immediately adjacent to private orchards, where there would be concerns about overspray even within appropriate weather conditions. Additionally, the fire hazard associated with the dead biomass will likely necessitate removal. Isolated pepper trees will be cut and the stump treated with triclopyr or imazapyr. The remaining tree biomass, if within 200 feet of residences, will be chipped and disposed of off site.

Within Reach 6b the dense stands of giant reed are present with a canopy of native species. Near the dam, large stands of Scotch broom dominate the upper slopes and are easily accessible via the staging area. Biomass removal is not possible in the reach and the steep channel and low private density will not require removal. Reach 6B consists of the entire stretch of Matilija Hot Springs Road, which is an extremely narrow, steep canyon that is only accessible via this road. There are footpaths that allow for access to the channel, as well as one ATV road that will need improvement, but access for vehicles of any type is limited. The contractor would be able to extend hoses down to crewmembers from the road in certain areas; however, the vast majority of Reach 6B will have to be done with backpacks. Giant reed and Scotch broom should be treated with a foliar application of glyphosate. There is one staging area near the dam. Size is limited, but the road is secured with a locked gate. The section of Reach 6B near the dam may require access through the private hot springs resort.

Table 12: Reach 6 Treatment Summary

Target Species	Recommended Treatment Methods	Herbicide/Surfactant Concentration	Biomass Removal Technique	Staging No.	Issues
Giant reed	Foliar Spray (backpack, spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant	Leave in place	S5, S6, S7, S8, S9	California red-legged frog and least Bell's vireo habitat Sensitive species
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S5, S6, S7, S8, S9	
Scotch broom	Foliar Spray (backpack, spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant;	Leave in place	S5, S6, S7, S8, S9	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S5, S6, S7, S8, S9	
Pepper tree	Cut/Daub	100% imazapyr/triclopyr	200 ft. buffer/chipped off site	S5, S6, S7, S8, S9	
Castor bean	Foliar Spray (backpack, spray rigs)	5% glyphosate, 5 fl. oz./100 gallons of surfactant	Leave in place	S5, S6, S7, S8, S9	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S5, S6, S7, S8, S9	

4.3 Reach 7A

Description
Reach 7A begins at the Matilija Reservoir Dam and continues upstream along Matilija Creek approximately 1.3 river miles. One named tributary from Rattlesnake Canyon drains into this reach, as well as several smaller unnamed tributaries. The reach encompasses approximately 160 acres and has perennially flowing water. Because of the dam, this area includes open water and an area of freshwater marsh where Matilija Creek flows into the reservoir. The main channel has permanently flowing water but many braids of additional channels are apparent. An area of development, the Matilija Environmental Science Area (MESA), is located in the northern portion of this reach.

Open water occurs near the dam and covers approximately 29 acres (18% of the reach). The reach is primarily riparian woodland (58 acres, or 37%) with a dense understory of giant reed. Riparian scrub (17 acres, or 11%) borders several active channels which comprise 16 acres, or 10%. Chaparral occupies 16 acres or 10% of the reach and scrub occupies 8 acres (or 5%) of the reach. Oak woodland occupies 8 acres (or 5%) of the reach. Freshwater marsh occupies 6.1 acres, or approximately 4% of the reach. Grassland occupies approximately 1 acre, or roughly 0.5% of the reach. Approximately 1 acre (0.5%) of development occurs in the reach. Habitat types are presented in Table 13 below which also includes acreages of infestation of all target invasive species.

Table 13: Habitat Types and Acreages in Reach 7A

Habitat	Project Area (acres)	Acres of Infestation	Acres of >50% Infestation
Active Channel	16.1	2.0	0.6
Chaparral	15.5	0.7	0
Developed	0.8	0	0
Freshwater Marsh	6.1	0.3	0
Grassland	0.7	0	0
Oak Woodland	8.1	0.3	0
Riparian Scrub	17.2	12	12
Riparian Woodland	58.3	45	42.5
Scrub	8.0	0.9	0.7
Open Water	28.8	na	0
Total	**159.6**	**61.2**	**55.2**

Sensitive Species
Approximately 12 acres of marginal breeding habitat and 1 acre of favorable breeding habitat were identified for the least Bell's vireo (Figure 7b). Approximately 4.8 acres of this habitat is infested by target invasive species. Additionally 25 acres of marginal breeding habitat and 1 acre of favorable breeding habitat for the southwestern willow flycatcher were identified (Figure 8b). Approximately 15.4 acres of this habitat is infested by target invasive species. California red-legged frog habitat was identified in 23 acres (Figure 9b, Appendix 1) and 5.6 acres are infested by target invasive species. Larvae, one juvenile, and one sub-adult California red-legged frog were observed within this reach during daytime field assessments. This reach has occupied California red-legged frog habitat and as such the following methodology have been developed based on agency review to reduce impacts to this species. Marginal and suitable habitat acreages for sensitive species and acreages of infestation for all target invasive species in Reach 7A are summarized in Table 14.

Table 14: Habitat Suitability for Sensitive Species in Reach 7A

Sensitive Species	Marginal and Suitable Habitat (acres)	Acres of Infestation	Acres of >50% Infestation
Least Bell's vireo	12.7	4.8	2.6
Southwestern willow flycatcher	26.2	15.4	14.5
California red-legged frog	23.4	5.6	4.6

Treatment

This reach and Reach 7B have the densest and most expansive infestations of giant reed. Field surveys estimated 43.9 acres of giant reed and 9.2 acres of Scotch broom. A small amount of salt cedar (0.02 acres) was detected in this reach. Castor bean was detected but at very low infestation levels, approximately 0.03 acres. No pepper trees were identified in this reach. These infestations occur in 45 acres of riparian woodland, 0.3 acre of oak woodland, 12 acres of riparian scrub, 0.9 acre of scrub, 0.7 acre of chaparral, 2 acres of active channel, and approximately 0.004 acre of development.

The majority of the giant reed, Scotch broom, and castor bean will be treated by foliar herbicide application with glyphosate and all dead material is anticipated to be left in place as cover for California red-legged frog. All green biomass will be chipped and moved off site to the nearest staging area (Figure 9b). Scotch broom outside of the channel will be treated using the cut and daub method with triclopyr or imazapyr. Similarly, salt cedar away from water will be treated with a foliar application of imazapyr or triclopyr using a backpack mister.

Accessibility for 7A is varied; depending on the time of season, staging areas are abundant. The main access routes into Reach 7A will be from an improved access path at the mouth of Rattlesnake Canyon, through the road leading to the dam, and from a four-wheel drive access road from the MESA (Figure 9b). Each of these paths, with the exception of the dam road will require significant alterations to make vehicular transport capable. The dam road will only access a small portion of the overall reach, as well as the boat access for the sporadic stands on the far side of the catchment area. Minimal application can be provided from Matilija Canyon Road for areas immediately adjacent to the road (100 feet). Once road access has been constructed to access the center of Reach 7A, large open expanses of small cobble islands are available for staging facilities. This could be dependent upon rainfall, but most islands are above the mean water level. These staging areas have the capability of facilitating large trucks, water trucks and spray rigs, if utilized. In addition, there are bathroom facilities and a storage facility across the channel from MESA. From each staging area, ATVs equipped with 50-gallon spray rigs could proceed to most areas within the reach. The use of spray rigs with hose attachments (300 feet) will be required for foliar application of this reach. There is no water source located within Reach 7A, with the exception of the creek. If possible, use of the catchment water may be needed, if not water must be brought in daily via water trucks filling from hydrants in lower reaches.

Table 15: Reach 7A Treatment Summary

Target Species	Recommended Treatment Methods	Herbicide/Surfactant Concentration	Biomass Removal Technique	Staging No.	Issues
Giant reed	Foliar Spray (backpack, ATV spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant	Leave in place	S10	Water source Sensitive species Access roads required
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	Chip offsite	S10	
Scotch broom	Foliar Spray (backpack, ATV spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant	Leave in place	S10	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	Chip offsite	S10	
Pepper tree	Cut/Daub	100% imazapyr/triclopyr	Disposal	S10	
Castor bean	Foliar Spray (backpack, ATV spray rigs)	5% glyphosate, 5 fl. oz./100 gallons of surfactant	Leave in place	S10	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	Disposal	S10	
Salt cedar	Foliar Application	5% imazapyr added with 2% glyphosate, 1 qt./100 gallons of surfactant	Leave in place	S10	

4.4 Reach 7B

Description

Reach 7B begins approximately 1.3 river miles from the Matilija Reservoir dam, extends approximately 4 river miles upstream, and encompasses approximately 290 acres. One named tributary in Lime Canyon connects to Matilija Creek in this reach as well as several smaller unnamed tributaries. An area with several hot springs occurs within this reach. Several private residences, a few with small orchards, occur on the north side of this reach adjacent to the paved road.

Riparian woodland occupies 95 acres, or 33% of this reach; oak woodland occupies 39 acres, or 14%; chaparral occupies 44 acres, or 15%; riparian scrub occupies 35 acres, or 12%; scrub occupies 38 acres, or 13%. The active channel comprises approximately 39 acres, or 13%. Habitat types are summarized in Table 16 below, which also includes acreages of infestation of all target invasive species.

Table 16: Habitat Types and Acreages in Reach 7B

Habitat	Project Area (acres)	Acres of Infestation	Acres of >50% Infestation
Active Channel	38.6	0.9	0
Chaparral	43.6	2.0	0
Oak Woodland	39.4	3.3	0
Roads	0.4	0	0
Riparian Scrub	35.1	6.3	2.7
Riparian Woodland	94.5	31.2	25.9
Scrub	38.3	6.1	1.5
Total	**289.9**	**49.8**	**30.1**

Sensitive Species

Approximately 26 acres of marginal breeding habitat and 6 acres of favorable breeding habitat were identified for the least Bell's vireo (Figure 7c). Approximately 4.8 acres of this habitat is infested by target invasive species. Twelve acres of marginal and 12 acres of favorable breeding habitat were identified for the southwestern willow flycatcher (Figure 8c) and approximately 0.6 acres is infested by target invasive species. California red-legged frogs were recorded in this reach (Figure 9c, Appendix 1) and 1.1 acres are infested by target invasive species. All life stages of California red-legged frogs were observed during field visits and approximately 42 acres were identified as suitable habitat. Marginal and suitable habitat acreages for sensitive species and acreages of infestation for all target invasive species in Reach 7B are presented in Table 17.

Table 17: Habitat Suitability for Sensitive Species in Reach 7B

Sensitive Species	Marginal and Suitable Habitat (acres)	Acres of Infestation	Acres of >50% Infestation
Least Bell's vireo	31.6	4.8	3.1
Southwestern willow flycatcher	23.8	0.6	0
California red-legged frog	41.9	1.1	0

Treatment

This reach and Reach 7A have the densest and most expansive infestation of giant reed. Field surveys estimated 43.9 acres of giant reed and 9.2 acres of Scotch broom. Very few individuals of salt cedar (0.03 acre), pepper tree (0.01 acre) and castor bean (0.03 acre) were identified in this reach. These infestations occur in approximately 31.2 acres of riparian woodland, 3.3 acres of oak woodland, 6.3 acres of riparian scrub, 6.1 acres of scrub, 2 acres of chaparral, and 0.9 acre of active channel.

Reach 7B was separated into 3 sub-reaches based on which methods of accessibility could be employed. Reach 7B1 through 7B3 require similar treatment methods, but with significantly different accessibility issues. The giant reed, Scotch broom, and castor bean will be treated by foliar herbicide application with glyphosate and all dead material is anticipated to be left in place. Salt cedar will be treated with a foliar application of imazapyr or triclopyr using a backpack mister. Within Reach 7B1, all stands of giant reed within fifteen feet of California red-legged frog occupied sensitive pools will be treated by pulling stands away from pools prior to foliar application, care should be taken not to disturb banks. Additionally, when dense stands of giant reed are intermixed with native canopy species, such as willow and cottonwood, precautionary measures must be taken to avoid impacts to these species during foliar application. In these circumstances, the giant reed should be pulled away from the trees before spraying. The cut and daub method may be required to prevent unintentional drift. Isolated pepper trees will be cut and the stump treated with triclopyr or imazapyr. The resulting tree biomass will be chipped off site.

Reach 7B1 has the most extensive staging area and access capabilities. At the upstream boundary lies a half-acre to one-acre staging area that is capable of holding a large amount of equipment behind a locked gate. The site is capable of accommodating the daily vehicular traffic, the storage bins, the water trucks, biomass storage, and most other equipment that would be utilized. Access to electricity is possible via the lines that run adjacent to the area. The staging area allows for access directly to the channel without major alteration to the existing stream bank. Additional access points are found near M.E.S.A., a footpath that could be improved to allow for ATV travel and via the M.E.S.A drive that was utilized in Reach 7A. No access can be managed via Matilija Canyon Road, with the exception of steep slopes with minimal target species present. The main types of equipment will include ATVs mounted with 50-gallon spray rigs and backpack sprayers. Larger rigs will not be able to access the interior due to large boulders and native trees. Their use may be limited to directly adjacent to the large access and staging points.

Reach 7B2 includes the portion of this reach that runs adjacent to the private residencies along Matilija Canyon Road. For this stretch the giant reed, Scotch broom, and castor bean will be treated by the cut and daub method within 200 feet of private residences. Also, non-herbicide methods such as tarping and repeated cutting will be implemented if herbicide use is not approved by the landowner. For areas further than 200 feet from private residences foliar application shall be employed. All green biomass will be chipped off site in an approved staging area. Where dense stands of giant reed are intermixed with native canopy species, such as willow and cottonwood, precautionary measures must be taken to avoid impacts to these species during foliar application. In these circumstances, the giant reed should be pulled away from the trees before spraying. The cut and daub method may be required to prevent unintentional drift. Salt cedar will be treated with a foliar application of imazapyr or triclopyr using a backpack mister. Isolated pepper trees will be cut and the stump treated with triclopyr or imazapyr. The resulting tree biomass will be chipped off site.

Accessibility in this reach is limited without approved access through private property. Access through multiple private lands is required to complete this reach. If access is granted through one or more properties, then the reach will be highly accessible. Without access to any private areas, the only access points are located on both sides of the private property and would require backpack access to treat the 1.5 mile area. With access to private lands, the use of spray rigs with hose attachments (measuring 300 feet) will successfully stretch to a large portion of the channel. Backpack sprayers may be required to treat far-reaching areas. Additionally, ATV access may be possible with access to one or more private landowners.

Reach 7B3 extends from the private stakeholder land to within the Blue Heron Ranch. For this stretch the giant reed, Scotch broom, and castor bean will be treated by foliar herbicide application with glyphosate and all dead material is anticipated to be left in place. Within Reach 7B3, all stands of giant reed within fifteen feet of occupied California red-legged frog sensitive pools will be treated by pulling stands away from pools prior to foliar application, care should be taken not to disturb banks. Additionally, dense stands of giant reed are intermixed with native canopy species, such as willow and cottonwood, precautionary measures must be taken to avoid impacts to these species during foliar application. In these circumstances, the giant reed should be pulled away from the trees before spraying. The cut and daub method may be required to prevent unintentional drift. Isolated pepper trees will be cut and the stump treated with triclopyr or imazapyr. The resulting tree biomass will be chipped off site. No salt cedar was noted within this reach, but if detected shall be treated with a foliar application of triclopyr of imazapyr using a backpack sprayer.

Accessibility to Reach 7B3 is via three main arteries: Matilija Canyon Road, Blue Heron Ranch Road, and a private driveway. Vehicular access is available for the entire length of this reach. However, the central channel will need to be accessed via foot traffic due to large boulders and steep terrain. The primary target species is sporadic stands of giant reed. These stands will need to be sought out, as they are not apparent, with the exception of one large stand near the Reach 8 boundary. The road will provide vehicular traffic to bring supplies, equipment, and water. This reach will require the predominate use of back sprayers; however, spray rigs can be utilized near roads. There are no water sources available within Reach 7B. Water trucks should be stationed along the road or at the staging area. With permission, water may be obtained from the creek.

Table 18: Reach 7B Treatment Summary

Target Species	Recommended Treatment Methods	Herbicide/Surfactant Concentration	Biomass Removal Technique	Staging No.	Issues
Giant reed	Foliar Spray (backpack, spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant	Leave in place	S11, S12, S13	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S11, S12, S13	Water source Sensitive species
Scotch broom	Foliar Spray (backpack, spray rigs)	7% glyphosate, 7 fl. oz./100 gallons of surfactant	Leave in place	S11, S12, S13	
	Cut/Daub	75% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S11, S12, S13	
Pepper tree	Cut/Daub	100% imazapyr/triclopyr	200 ft. buffer/chipped off site	S11, S12, S13	
Castor bean	Foliar Spray (backpack, spray rigs)	5% glyphosate, 5 fl. oz./100 gallons of surfactant	Leave in place	S11, S12, S13	
	Cut/Daub	5% glyphosate, 7 fl. oz./100 gallons of surfactant	200 ft. buffer/chipped off site	S11, S12, S13	
Salt cedar	Foliar Spray	5% imazapyr & 2% glyphosate, 1 qt./100 gallons of surfactant	Leave in place	S11, S12, S13	

4.5 Reach 8

Description
Reach 8 begins approximately 5.3 river miles upstream of the Matilija Reservoir dam and continues approximately 1.6 river miles upstream to the confluence of Old Man Creek and Matilija Creek. The reach encompasses approximately 118 acres. Two named tributaries connect to Matilija Creek in this reach; Murietta Creek and the Upper North Fork of Matilija Creek. Several unnamed tributaries connect to Matilija Creek in this reach in addition to the named tributary. One private residence with a small orchard occurs in this reach.

Vegetation in this reach is dominated by chaparral, which occupies approximately 62 acres, or 53% of the reach. Approximately 15 acres (or 13%) is occupied by oak woodland; another 15 acres (or 13%) is occupied by riparian scrub; 11.8 acres (or 10%) is occupied by riparian woodland; and 9 acres (or 8%) is occupied by scrub. The active channel comprises approximately 5 acres, or 4% of the reach. Open water was present throughout the creek channel at the time of field surveys. Habitat types are summarized in Table 19, which also includes acreages of infestation of all target invasive species.

Table 19: Habitat Types and Acreages in Reach 8

Habitat	Project Area (acres)	Acres of Infestation	Acres of >50% Infestation
Active Channel	5.2	0	0
Chaparral	61.8	0.2	0
Oak Woodland	15.1	0	0
Riparian Scrub	14.6	0	0
Riparian Woodland	11.8	0	0
Scrub	9.2	0.2	0
Total	**117.6**	**0.4**	**0**

Sensitive Species

Approximately 1.5 acres of marginal breeding habitat for the least Bell's vireo was identified in this reach (Figure 7d). Additionally, 17 acres of suitable habitat was identified for California red-legged frogs (Figure 9d) of which 0.05 acre were infested by target invasive species. Marginal and suitable habitat acreages for sensitive species and acreages of infestation for all target invasive species in Reach 8 are presented in Table 20.

Table 20: Habitat Suitability for Sensitive Species in Reach 8

Sensitive Species	Marginal and Suitable Habitat (acres)	Acres of Infestation	Acres of >50% Infestation
Least Bell's vireo	1.4	0	0
Southwestern willow flycatcher	0	0	0
California red-legged frog	16.8	0.05	0

Treatment

Giant reed occurs in scattered stands within this reach. Field surveys estimated 0.48 acre of occupied habitat. Scotch broom was also found at lower levels than downstream reaches and was estimated at less than 0.01 acre. No salt cedar, pepper tree or castor bean individuals were identified. These infestations occur in approximately 0.05 acre of riparian woodland, 0.03 acre of oak woodland, 0.03 acre of riparian scrub, 0.2 acre of scrub, 0.2 acre of chaparral, and 0.01 acre of active channel.

Accessibility throughout Reach 8 is via a privately owned road that runs almost the entire length of the reach. The final northern segment (1/10 mile) is only accessible via foot traffic. There is one additional trail extending from the private road, which allows for ATV access to the upper reaches of the adjacent tributary. Access to this private road will be required. Although the road allows for access, the treatment will be by foliar herbicide application with mix of backpack application and spray rig with hose attachments. The road only allows for the staging of equipment. The infestations of target species are located along the immediate channel, which is greater than 200 feet from the road. Therefore, backpack applicators may be required to traverse the channel to access the infestations.

The primary focal species will be giant reed. Because there are no water sources available, the use of a water truck or the use of water from the creek will be required. Since the giant reed infestations are small and sparse, biomass will be left in place.

Table 21: Reach 8 Treatment Summary

Target Species	Recommended Treatment Methods	Herbicide/Surfactant Concentration	Biomass Removal Technique	Staging No.	Issues
Giant reed	Foliar Spray (backpack, ATV spray rigs)	7% glyphosate, 7 fl. oz. per 100 gallons surfactant	Leave in place	S14	Water source, Sensitive species, Access (hiking)
Scotch broom	Foliar Spray (backpack, ATV spray rigs)	6% glyphosate, 7fl.oz/100 gallons of surfactant	Leave in place	S14	

4.6 Reach 9

Description
Reach 9 begins at the confluence of Old Man Creek and Matilija Creek, continues approximately 2.6 river miles upstream, and encompasses approximately 54 acres. Several unnamed tributaries connect to Matilija Creek in this reach. This reach is steeper gradient than the lower reaches and has two mapped waterfalls in the northern portion. The channel is narrow and comprised of large boulders and cobble.

The vegetation in this reach is primarily riparian woodland (36.5 acres, or 68% of the reach). Chaparral and scrub occupy 1.5 acres (2.7%) and 4.6 acres (8.5%), respectively. The active channel encompasses 1.5 acres (2.7%); 4.5 acres (8%) of the reach has not been surveyed. Habitat types are presented in Table 22 below which also includes acreages of infestation of all target invasive species.

Table 22: Habitat Types and Acreages in Reach 9

Habitat	Project Area (acres)	Acres of Infestation	Acres of >50% Infestation
Not Sampled	4.5	na	0
Active Channel	1.5	0	0
Chaparral	6.7	0.1	0
Riparian Woodland	36.5	0.2	0
Scrub	4.6	0.1	0
Total	**53.7**	**0.3**	**0**

Sensitive Species
This area did not appear suitable for either the southwestern willow flycatcher or the least Bell's vireo. However, 29 acres of suitable California red-legged frog habitat was identified (Figure 9d) and 0.2 acre of this habitat was infested by target invasive species. There were no observations of California red-legged frogs during daytime surveys in this reach. Western pond turtles were observed during field surveys in this reach. Marginal and suitable habitat acreages for sensitive species and acreages of infestation for all target invasive species in Reach 9 are presented in Table 23.

Table 23: Suitable Habitat for Sensitive Species in Reach 9

Sensitive Species	Marginal and Suitable Habitat (acres)	Acres of Infestation	Acres of >50% Infestation
Least Bell's vireo	0	0	0
Southwestern willow flycatcher	0	0	0
California red-legged frog	29.2	0.2	0

Treatment
Giant reed was identified in this reach and estimated to occupy a 0.4-acre area. These infestations occur in approximately 0.2 acre of riparian woodland, 0.1 acre of scrub, 0.1 acre of chaparral, and 0.01 acre of active channel. No other invasive target species were encountered during field surveys. The target species is giant reed. Infestations are sporadic throughout the reach and none of the stands are considered large.

Reach 9 has been separated into two sub-reaches because of accessibility. Reach 9a is a difficult area to access. There is no vehicle access and there are no foot trails into this reach. This reach requires the use of backpack sprayers, as no other type of equipment can be utilized. The creek is the only water source; otherwise, all water would have to be hiked in to the area. Because of the remoteness of this reach and the small infestations, giant reed will be treated with foliar herbicide application and all biomass will be left in place. Care should be taken to avoid application to any open water sources.

Reach 9b is an extremely difficult area to access. The primary species will be giant reed; however, there are only small infestations. The only means of spray equipment that can be utilized will be backpack sprayers. The only accessible water source is the creek. The trail leading to Reach 9b is non-existent; the contractor must proceed via the channel. The impediment to reaching the final extent is several large waterfalls that will require OSHA-certified rope access technicians to ascend and treat the invasive species.

Table 24: Reach 9 Treatment Summary

Target Species	Recommended Treatment Methods	Herbicide/Surfactant Concentration	Biomass Removal Technique	Staging No.	Issues
Giant reed	Foliar Spray (backpack)	7% glyphosate, 7 fl. oz./ 100 gallons of surfactant	Leave in place	S14	Water source, Access (hiking, rope)

5.0 PROPOSED BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

Most of the target invasive species addressed by this Plan occur in sensitive habitats along Matilija Creek and Ventura River. Some eradication techniques have the potential to negatively affect the surrounding native habitat and associated sensitive species. The following mitigation measures and BMPs are intended to minimize the Project's potential effects on the surrounding habitat while allowing the most appropriate eradication techniques to be used.

5.1 General Construction BMPs

The following general BMPs are applicable to all invasive plants control techniques and access work.

Limits to Site Disturbance
- Contractor shall limit the work area to the smallest area possible.
- Contractor shall limit soil disturbance to the maximum extent possible.
- Contractor shall limit native vegetation and tree damage to the maximum extent possible.
- Contractor shall locate staging areas in designated areas outside of the active channel.
- Contractor shall designate access roads to avoid damage to native vegetation to the maximum extent possible and limit to the smallest area possible.

Site and Personnel Management
- Contractor shall be responsible for being in compliance with all applicable permit conditions.

- Contractor shall coordinate Project scheduling with the biological monitor to allow the biological monitor adequate time to schedule monitoring activities.
- Chemical toilets for personnel shall be kept in staging areas during removal activities.
- Contractor shall limit extraneous noise to the maximum extent possible (e.g., radios for entertainment).
- Equipment and machinery use shall comply with all applicable noise ordinances and policies.
- Smoking shall not be allowed on site except in designated staging areas.
- No invasive species removal work shall occur at night.
- Signs shall be posted on affected trails for a sufficient time to warn trail users of equipment crossings. The signs shall be posted on either side of the active access and shall be maintained for the entire period of Project-related trail use.
- Signs and flaggers shall be used in areas where equipment use would access paved roads.
- All neighbors within 100 feet of work areas shall receive notice of the proposed work schedule at least one month before start of work.
- All trash items shall be enclosed in sealed containers and regularly removed from the site.
- Disposal of Project waste materials such as trash, used equipment, oil, grease and chemicals shall be done in accordance with Federal, State and local regulations.
- Stockpiling of cut vegetation shall not occur within waters of the U.S. Materials shall not be stockpiled for more than one month and shall be disposed of properly.
- Pets of Project personnel shall not be allowed on site.
- Trash must be removed daily.

Personnel Education

- All Project personnel shall be briefed on environmental concerns regarding the Project, including the use of herbicides, appropriate work practices (including spill prevention and response measures) and other measures needed to minimize Project impacts.
- All Project personnel will participate in an educational program to identify the target plant species on site prior to invasive plant control activities.
- Before any giant reed removal activities begin, a USFWS-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the California red-legged frog and its habitat, the importance of the California red-legged frog and its habitat, the general measures that are being implemented to conserve the California red-legged frog as they relate to the Project, and the boundaries within which the Project may be accomplished. Brochures, books, and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

Air Quality BMPs

- Prohibit private vehicle engine idling in excess of two minutes and restrict diesel engine idle time, to the extent practical, to no more than 10 minutes.
- Require all trucks to cover their loads as required by California Vehicle Code §23114.
- Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip.
- Post on site signs that limit traffic to 15 miles per hour or less.
- During period of high winds (i.e., wind speed sufficient to cause fugitive dust impacts to adjacent properties), all clearing, grading, earth-moving, and excavation operations shall be curtailed to the degree necessary to prevent fugitive dust created by activities from being a nuisance or hazard, either off site or on site.
- Adjacent streets and roads shall be swept at least once per day, preferably at the end of the day, if visible soil material is carried over to adjacent streets and roads.
- Personnel involved in grading operations, including contractors and subcontractors, should be advised to wear respiratory protection in accordance with OSHA regulations.

Water Quality BMPs

- Contractor shall be responsible for preparing and implementing a Stormwater Pollution Prevention Plan.
- Erosion control measures (e.g., silt fencing, mulch, matting, soil binder, seeding) will be implemented as appropriate to inhibit sediment transport into the waterways.
- Stockpiles shall only be allowed in designated staging areas. Chipped plant material shall not be stockpiled on site for more than one month.
- No work shall occur during rain events.
- Herbicide storage during application and the fueling and lubrication of mechanical equipment shall be confined to designated staging areas.
- Vehicles and equipment shall not be left in the stream channel overnight.
- Spill kits shall be maintained on site and shall be adequately stocked for the amount of fuel and herbicides to be handled.
- Refueling of vehicles/equipment and mixing of herbicides shall occur at designated staging areas at least 100 feet from riparian and wetland habitats where feasible. Where it is not feasible to refuel vehicles/equipment and mix herbicides in designated staging areas due to topographical constraints, these activities shall occur as far away from riparian and wetland habitats as feasible.
- Appropriate spill containment devices (e.g., spill mats, tarpaulins) shall be used when refueling vehicles/equipment or mixing herbicides.
- In the event of a hazardous material spill within the floodplain, wetland or riparian area associated with the Project Area, USFWS must be contacted within 24 hours to determine the proper course of action and clean-up methods. If a spill occurs on a weekend or late Friday, USFWS must be contacted by close of business the following Monday.
- All vehicles and equipment used within the floodplain or associated riparian area of Project Area must be inspected daily to ensure they are free of any leaks of fuel, cooling, lubricating or other potentially polluting fluid.
- No vehicles or other heavy equipment shall be rinsed or cleaned within the waters, floodplain or associated riparian areas of Project Area. All necessary precautions must be taken to prevent release of any toxic substances into the waters or onto soils of the Project Area.

Water Diversion BMPs

- Water may be taken from the creek only in authorized areas in order to prepare herbicide applications.
- A clean pump, only used for water, shall be used to extract water from the creek.
- The pump rate shall not exceed 100 gallons per minute.
- The intake hose for powered pumps shall be placed to avoid accidental intake of aquatic species,
- The intake hose for powered pumps shall be fitted with a screen structure to avoid accidental intake of aquatic species. The screen size shall not exceed 3/32 inch diameter for round openings, 3/32 inch diagonally for square openings, and 3/32 inch in length for slotted openings.
- The approach velocity (velocity perpendicular to screen face) shall not exceed 0.40 feet per second.

Noise BMPs

- Use of loud hand-held construction equipment, such as chain saws, heavy-duty construction equipment and trucks shall not occur between the hours of 7 p.m. and 7 a.m.
- Construction equipment shall be operated with standard factory silencer and/or muffler equipment. Equipment engine covers shall be in place and mufflers shall be in proper working order.

5.2 Biological Resources

- A biological monitor shall be present at all times during
    - all ground disturbing activities, such as bulldozing and construction of access roads,

  - work within 328 feet (100 meters) of potential California red-legged frog habitat, year round.
- A California red-legged frog relocation plan shall be approved by USFWS before commencement of giant reed removal activities. The relocation plan shall identify appropriate areas to receive translocated California red-legged frogs. These areas must be in proximity to the capture site but outside any area likely to be adversely affected by construction activities.
- If sensitive biological resources are found during construction activities, the biological monitor shall have the authority to stop work in the Project Area in order to protect the sensitive biological resource and will implement the relocation plan or other protective measures.
- Preconstruction surveys for sensitive species (such as California red-legged frog, two-striped garter snake and southwestern pond turtle) shall be conducted within 24 hour before mobilization of heavy equipment.
- The qualifications of biologists contracted to survey for, capture, and move California red-legged frogs out of harm's way shall be provided to USFWS for review and approval at least 30 days prior to the commencement of surveys and/or relocation efforts. No surveys and/or relocation activities shall begin until written approval has been received from USFWS that the biologist(s) is (are) qualified to conduct the work.
- Surveys for California red-legged frogs must be conducted if an open trench has been created that may trap this species. Open trenches must be surveyed by authorized biologists for California red-legged frogs each morning that the trench remains open and accessible to this species.
- California red-legged frogs in danger of being taken by Project activities must be relocated to nearby appropriate habitat outside of harm's way by biologist(s) authorized by USFWS following the Relocation Plan guidelines included as Appendix 1.
- The authorized biologist(s) must minimize the duration of handling and captivity of California red-legged frogs. While in captivity, individuals of this species must be kept in a cool, moist, aerated environment, such as a bucket containing a damp sponge or damp vegetation, and they must be maintained in a manner that does not expose them to any environmental conditions that could cause injury or undue stress (such as direct sunlight or excessive time spent in the container). Containers used for holding or transporting these species must not contain standing water (to avoid exhausting the frog by necessitating that it swim). California red-legged frogs should not be transported in the same bucket with western toads or other amphibian species (to avoid direct exposure to other animals' toxins and to minimize the potential for disease transmission).
- Soaps, oils, creams, lotions, repellants, nicotine or solvents of any sort must be cleaned from the hands of any personnel when they are capturing and relocating and California red-legged frogs.
- To avoid transferring disease or pathogens between aquatic habitats during the course of surveys and handling of California red-legged frogs, the USFWS-approved biologist must follow the Declining Amphibian Population Task Force's Code of Practice. Precautionary measures must be taken so that all traces of disinfectant have been removed from the equipment before it is used in a new aquatic habitat.
- If least Bell's vireo, southwestern willow flycatcher, or raptor nests are found, Project activities shall be set back a minimum of 500 feet from nest sites or avoided until the young have fledged.
- During initial invasive plant control activities outside of the bird breeding season, if nesting birds protected by the Migratory Bird Treaty Act are found, a buffer shall be marked around the nest to prohibit treatment activities within this buffer. The buffer shall be a 100-foot radius for activities involving mechanized equipment, such as mowers and chainsaws. The buffer shall be a 15-foot radius for activities involving only hand tools such as sprayers and handsaws.
- During retreatment activities within the bird breeding season, a biological monitor shall be present at all times. If nesting birds protected by the Migratory Bird Treaty Act are found, a 100-foot buffer shall be marked around the nest to prohibit construction activities within this buffer.

5.3 General Herbicide BMPs

The following BMPs shall apply to all herbicide application techniques.

- Within 15 feet of surface water, treatments shall use a glyphosate-based herbicide such as Rodeo® and/or Aquamaster®, both of which are labeled for use within water. The use of less toxic surfactants such as Agri-Dex or LI-700 is permitted within this zone. The relatively toxic surfactant R-11 must not be used within this zone. No other surfactants may be used within 15 feet of surface water without the prior written approval of USFWS.
- The cut and daub method of herbicide application shall be used within 200 feet of homes.
- Herbicides shall be applied to target species at concentrations specified in Section 3.2 of this Plan.
- Herbicides shall be mixed with a non-toxic, water soluble dye of low toxicity that highlights treated areas.
- Overspray of herbicides onto non-target species shall be minimized by restricting herbicide spraying when wind velocities exceed 6 mph.
- A licensed professional shall conduct or oversee herbicides applications.
- Herbicides shall not be applied when it is raining or when rain is forecasted within 24 hours, in order to prevent runoff of herbicides.
- Herbicide label directions shall be followed unless under guidance of a Pest Control Advisor.

Foliar Herbicide Spraying BMPs

- Booms or ladders shall not be used for foliar spraying within 15 feet of surface water. Herbicides shall be applied using the cut and daub technique within this setback.

Cut and Daub Application BMPs

- Canes or trunks of target species shall be cut to less than 12 inches in height and the herbicide shall be applied immediately (within 30 seconds) to the cut and daub.
- Biomass from the cut vegetation must be removed from the Project Area and disposed of properly.

6.0 MONITORING

6.1 Post-Treatment Vegetation Monitoring

Treatment efficacy will be monitored through permanent photographic stations. Stations will be located in representative areas in the reach, with respect to target invasive species infestations. Multiple photographic stations will be established within a reach to capture the range of treatment implemented. At each station the amount of regrowth will be visually assessed by species and recorded as percent infestation for the polygon(s) represented in the photograph. This approach will allow for comparison with the initial infestation assessment. In addition to polygon specific photographs, panoramic or landscape level photographs will be taken quarterly to assess the treatment efficacy and recolonization of the Project Area by native plant species.

6.2 Water Quality Monitoring

A Water Quality Monitoring Plan (WQMP) will be prepared prior to eradication activities. The WQMP will guide the collection of water quality data in order to assess the Project's effect on water quality before, during and after the implementation of the Project (Figure 10).

The Ventura River Stream Team (Stream Team) has an ongoing water quality monitoring program in the Ventura River Watershed and has over five years of data. The Project WQMP will be based on the Stream Team's WQMP and will incorporate its sampling points and techniques, with additional sampling points upstream of the Matilija Dam.

The parameters to be addressed in the WQMP include temperature, conductivity, turbidity, dissolved oxygen, pH, and stream flow. Monitoring will occur at least quarterly in conjunction with the Stream

Team's regularly scheduled monitoring. It is anticipated that monitoring will be conducted by the Stream Team's qualified staff and/or volunteers.

Water quality monitoring will be conducted in accordance with an approved Quality Assurance Project Plan (QAPP), such as the Stream Team QAPP. This QAPP will be reviewed and modified, if necessary, for the Project. Water quality data collected as a part of this Project will be entered, evaluated and stored in the VCWPD water quality database.

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