



VEGETATION MANAGEMENT PLAN

Prepared by:

Winters Putah Creek Committee

Adopted December 18, 2007

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1 Purpose of this Document

This plan describes general procedures to be used for managing vegetation on public lands bordering Putah Creek between the Railroad Avenue Bridge and Interstate 505, as shown in Figure 1¹. This land area, referred to as the Winters Putah Creek Nature Park, totals about 40 acres, about 20 percent of which is open water.

In 2006, the Lower Putah Creek Coordinating Committee held a series of public meetings in Winters to review data collected for the Watershed Management Action Plan and identify priority sites for restoration. The community gave the Nature Park top priority for watershed restoration. This Vegetation Management Plan is part of a comprehensive effort to replace invasive weeds with native vegetation throughout 30 miles of Lower Putah Creek and tributaries. The plan will become a part of the updated Putah Creek Master Plan that is scheduled for adoption in 2007, and will be updated periodically as needed. A historical background of the formation of Winters Putah Creek Park and restoration activities is provided in Appendix A.

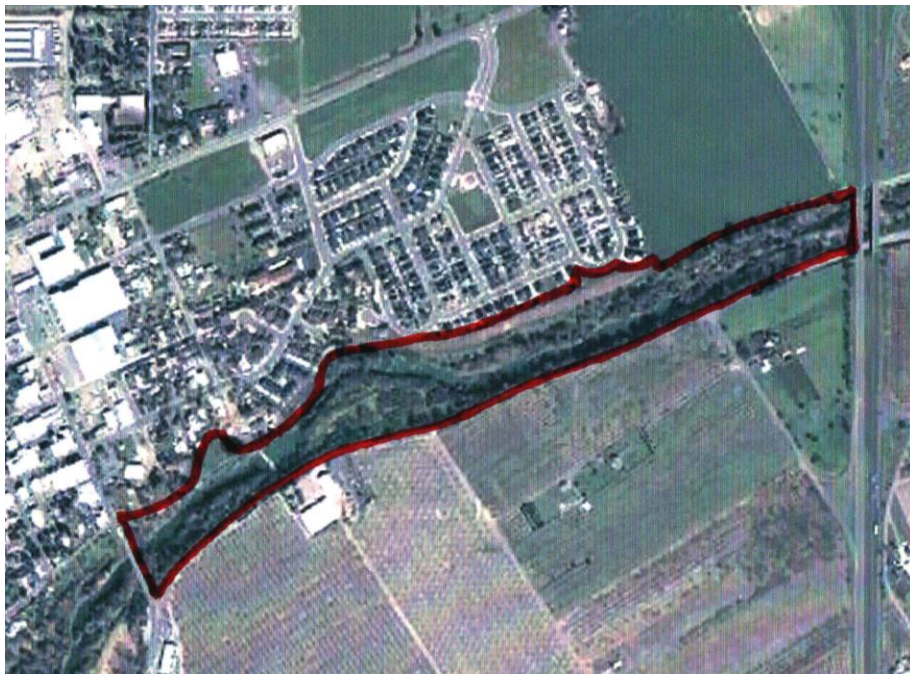


Figure 1: Extent of Winters Putah Creek Nature Park

With the removal of star thistle, the establishment of paths, and other improvements, the Putah Creek Nature Park has become a significant asset to the community that is enjoyed by many. This plan has the objective of facilitating continued improvements to enhance recreational uses and restore habitat, including replacement of invasive plants with native species and removal of plants that inhibit access to the creek. This plan also recognizes the importance of minimizing disruption of existing recreational uses during the restoration process, and the need to balance habitat restoration with recreational needs.

¹ Some of the inscribed land in Figure 1 is under private ownership.

2 Current Plant Species

2.1 Natives²

The upper north bank is populated by native trees including, valley oak (*Quercus lobata*), and buckeye (*Aesculus californica*). Sycamore (*Platanus racemosa*), white alder (*Alnus rhombifolia*), cottonwood (*Populus fremontii*), Oregon Ash (*Fraxinus latifolia*), and willow (*Salix* sp.) grow within the creek channel. Many of these trees have reached a considerable height and host woodpeckers, hawks, egrets, herons, and other desirable birds.

Of perennial native shrubs not planted by volunteer efforts within the past ten years, elderberry (*Sambucus mexicana*) and wild rose (*Rosa californica*) are the most prevalent. Poison oak (*Rhus diversiloba*) is also present on the lower terraces, and California grape (*Vitis californica*) is common along the steeper creek banks.

Except for some naturally occurring annuals such as miner's lettuce (*Montia perfoliata*) and sparsely occurring lupines (*Lupinus* sp.), the population of annuals is dominated by non-native annual grasses and dicotyledonous weeds.

2.2 Invasives

Of the 32 acres of land between the Railroad Avenue bridge to the west and Interstate 505 to the east, approximately twenty-five percent is covered by one or more of 12 priority invasive weeds: arundo, black locust, catalpa, domestic almond, English ivy, eucalyptus, fig, Himalayan blackberry, pepper tree, tamarisk, tree-of-heaven and Virginia creeper. Throughout the riparian corridor of Lower Putah Creek there are 1,800 occurrences of 20 primary invasive weeds occupying approximately 10 percent of the land area. Winters Putah Creek Park has about the same number of weeds per acre as the average reach of Putah Creek and has the highest population of eucalyptus upstream of the Interstate 505 overpass. A complete listing of invasive weeds found in the creek channel and their distribution is provided in Chapter 7 of the *Lower Putah Creek Watershed Management Action Plan*.

2.3 Walnut (*Juglans Hindsii*)

Walnut trees may or may not be native and will be treated on a case by case basis.

3 Protection of Existing Vegetation

3.1 General Approach to Projects

To ensure the success of plant removal and restoration projects, work plans will be carefully reviewed at the time funding opportunities are evaluated. The committee will work closely with funding proponents and grant administrators to craft grant concepts or applications that are protective of native vegetation and compliant with this Vegetation Management Plan and the wishes of the community. Grant administrators and/or City Staff will provide annual work plans for committee review and approval.

² Appendix D of the *Lower Putah Creek Watershed Management Action Plan* provides a complete inventory of native and non-native plants in the Lower Putah Creek watershed.

3.2 Protection of Native Trees

All native trees should be protected from damage during the removal of non-native vegetation, tree cutting, spraying, grading, or other restoration activities, though channel reshaping may require removal of some natives.

Existing native trees provide shade and greenery and help dissipate noise from Putah Creek Road. Some of these trees, particularly native walnut, are diseased and infected with mistletoe. Diseased native trees may be removed if deemed a physical hazard to humans, wildlife or park infrastructure or become an impediment to approved future park renovation projects. Following removal, replacement plantings should be done so that there is no net loss to effective tree canopy area when trees are at maturity. A watering system should be installed to assist their initial establishment. Trees that do not survive should be replaced within one year.

3.3 Elderberry Protection

Elderberry shrubs (*Sambucus* sp.), prevalent along Putah Creek in Winters, are the sole host plant for the federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). The Conservation Guidelines for the Valley Elderberry Longhorn Beetle (revised 1999) were developed by the U.S. Fish and Wildlife Service to "...assist Federal agencies and non-federal project applicants needing incidental take authorization through a Section 7 consultation or a Section 10(a)(1)(B) permit in developing measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle." In conducting restoration work, including trail cutting to access non-native plants, spraying or mechanical removal of invasives and creek grading, measures to protect elderberry plants shall follow these guidelines to the maximum extent possible, including replacement of plants that are removed during grading.

For specific projects that may involve removal of plants 1 inch or greater, the responsible agency will obtain a permit from the U.S. Fish and Wildlife Service, which provides project-specific directions and requirements for removal and replacement.

3.4 Protection of Vegetation While Spraying

During 2004 over-spray of herbicides targeting star thistle resulted in damage to ornamentals, fruit trees, and grapes planted on residential properties along Creekside Way. In the spring of 2007 spraying to control invasive weeds unintentionally damaged non-target plants including elderberry, miners lettuce, wild rose, oak, and almond. Dennis Chambers, Yolo County Deputy Agricultural Commissioner, completed an investigation of the 2007 incident and suggested measures to reduce the risk of damage to non-native species, including:

- Timing herbicide applications when desirable species are dormant
- Directing spraying away from and shielding desirable plants
- Use of hand held application equipment

Follow-up recommendations by Putah Creek Stream Keeper Rich Marovich, are provided in Appendix B. Marovich stated the "use of Milestone® Herbicide within 20 feet of elderberries is suspended pending further studies to determine if it can safely be used in proximity to elderberries in the dormant season." Appendix B also provides information on how to manage risks of damage to non-target vegetation resulting from application of Garlon 4 herbicide.

This plan adopts the following measures to protect plants from future spray damage:

1. No spraying shall be conducted while any native deciduous plants are emerging from dormancy.
2. To protect native annuals such as miner's lettuce and other sensitive plants as well as non-target ornamentals and fruit trees, spraying should be limited to hand-held equipment such as backpack or ATV-mounted tanks. Broadcast spraying will be reviewed in advance on a case-by-case basis by the WPCC.
3. No herbicides shall be used that may damage dormant native species.
4. Treatment of individual stumps with herbicide may be conducted at any time of year provided precautions are taken to protect nearby elderberry and other non-target species.

3.5 Mowing

Grasses and other vegetation can become fire hazards when dry, and city ordinances call for mowing to reduce this fire danger. Mowing can damage desirable plants such as small native shrubs, trees and deergrass that have been planted as part of the restoration effort. All such plants should be staked prior to mowing, and mower blades should be set high enough to avoid damage to creeping wild rye grass or irrigation systems. The WPCC will coordinate the placement of stakes with Winters Public Works.

4 Removal of Invasive Species

4.1 Goals and Justification

Invasive weeds by definition rapidly spread and colonize ever-larger portions of the landscape unless they are actively controlled. Uncontrolled populations degrade downstream areas by spreading seeds, roots and stems that start new infestations. At Winters Putah Creek Park, invasive weeds, especially blackberry and arundo prevent access to the water in many areas and severely limit recreational opportunities. They also provide concealment for encampments by homeless persons and impede the discovery and removal of solid waste.

Removal of invasive weeds with currently available resources is an essential first step toward restoration of habitat and recreational value. Weeds currently obstruct access for engineering surveys for future improvements. Weed control demonstrates readiness for future grant-funded improvement projects. The most competitive proposals for public funding to manage vegetation will combine geomorphic restoration with vegetation management because the results will be more permanent and sustainable.

4.2 Strategies

Efficient weed management entails selective treatment of weeds with herbicides preceded or followed by mechanical removal. Some weeds may be left to decompose in place where access for mechanical removal is limited. In addition, logs salvaged from vegetation removal activities may be recycled along the creek to help stabilize constructed flood terraces.

Equipment access is essential for economical weed spraying and removal. Many sites in Winters Putah Creek Park have limited visibility and access due to dense undergrowth especially by blackberry thickets. Pioneering trails through these thickets is an essential

first step to assess, treat and remove weeds. Measures to protect elderberry shrubs and nesting birds will be implemented before trails are constructed. Specific treatment methods for invasives are listed at the following web site:

<http://tncweeds.ucdavis.edu/esadocs.html>.

4.3 Timing and Schedule

The timing of vegetation removal will depend upon the availability of resources, manpower, accessibility, equipment, and other factors. The season for weed control is largely limited to the winter months when native vegetation is dormant. This improves visibility and therefore worker safety and it also takes advantage of the selectivity of Roundup (glyphosate) herbicide against blackberry, arundo and eucalyptus because Roundup does not affect dormant vegetation. When weeds are intertwined with native vegetation (often the case with blackberry) then winter is the only season when blackberries can be treated without damage to native plants.

Many herbicides are also most effective in winter months when weeds are not actively growing. Treatment of weeds in spring and summer is often ineffective because the weeds are growing so fast that they dilute the herbicide with growth or the herbicide kills the top of the plant and leaves the roots alive to resprout (e.g. arundo). Roundup in particular works best in the fall and winter because it is slowly absorbed and translocated throughout the plant. Weeds treated with Roundup in the fall and winter take in the herbicide more thoroughly than at other times and control is much greater from any given application.

The season for effective weed control is often extremely limited. High rainfall and sustained high flows in Putah Creek have curtailed most weed control operations in 2002-2003, 2004-2005 and 2005-2006. Weed control with equipment is also limited by the bird nesting season (March through July) and by terms of grants that fund weed removal.

Control of herbaceous weeds such as milk thistle, yellow star thistle, mustards, and riggut brome should be timed to coincide with native grass restoration when final grade is established. Native grasses in particular require aggressive herbaceous weed control in the first year but then provide weed resistant landscapes and diminishing requirements for weed control over time.

Figure 2 outlines a general schedule for phased removal of Eucalyptus trees and other non-natives. The east half of the Nature Park extends from the Interstate 505 bridge to the Creekside Way access point. The next quarter extends from the Creekside Way access point to the percolation dam. The fourth quarter extends from the percolation dam to the Railroad Avenue Bridge.

4.4 Species to be Removed

Invasive plant species targeted for removal are listed in Appendix C, and a map showing the location of invasives is provided in Appendix D. Woody and shrubby weeds such as eucalyptus, tamarisk, tree-of-heaven and Himalayan blackberry are the highest priority for control and removal because they compete most vigorously with native vegetation and impede surveys for other improvements.

4.5 Permissions

Some of the land inscribed in Figure 1 is under private ownership. This includes the McClish property adjacent to Interstate 505 and the apartments west of Caselli Court.

Ownership of these properties extends to the center of the creek, and the City must either obtain permission for work to be done or acquire this property.

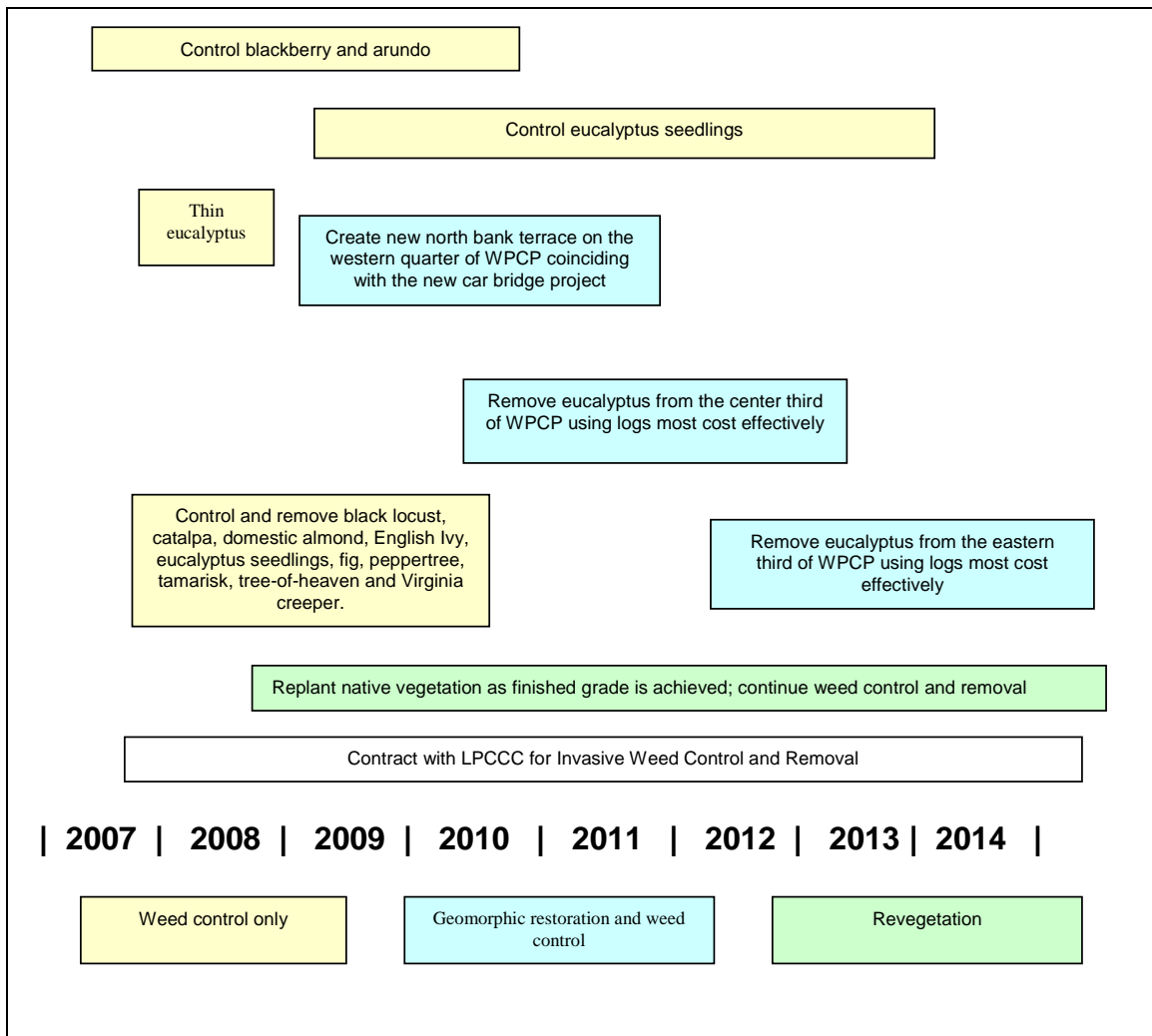


Figure 2: Proposed Schedule & Tasks for Vegetation Removal³

5 Re-Vegetation Plan

5.1 Goals

Re-planting with native plant species is needed to discourage the re-emergence of non-native plants and to create a sustainable natural environment that attracts wildlife populations and enhances enjoyment by Winters citizens and visitors. Re-vegetation should occur as soon as possible following removal of invasive species except for areas that may be disturbed by pending modifications to the creek channel.

³ Pending approval for individual projects through all applicable state and federal regulations as described in Appendix E

At a neighborhood meeting of Winters citizens held on April 7, 2007, a commonly held concern was that removal of Eucalyptus trees and other vegetation would leave the area barren for many years. In some locations there are no native trees in the understory, and 20 years of growth or more will be required to establish trees that provide the amount of shade or habitat that Eucalyptus currently provide.

Vegetation removal proposals should include a schedule for replanting and a description of who will perform the work, how it will be maintained, and how it will be funded. A priority of the re-vegetation plan is to plant fast growing native trees immediately after removal of the Eucalyptus, and to nurture them with water and fertilizer to insure fast growth.

5.2 Strategy and Timing

Sites that periodically flood will often passively restore to native vegetation when weeds are removed, especially where channel form and function has been restored. However, to insure that re-vegetation of desired species can occur soon after removal of invasives and other species, future grant applications should request balanced funding to provide for re-vegetation (including irrigation systems as needed) soon after removal. In locations that are several feet above the flow channel, irrigation systems should be provided at the time of replanting.

In areas that are below the median winter flows, cleared areas may be left to scour naturally down to functional elevations before replanting. Vegetation such as cottonwoods and willows that require access to groundwater should not be planted more than two or three feet above low flow channel elevation where they naturally occur on the creek.

Water is the most essential requirement of new plantings. Through at least the first season it is a matter of survival. Plants that are close to the low flow channel in distance and elevation may not require supplemental water, but all other plantings will require irrigation by drip, micro sprinkler, sprinkler or hand watering. If drip systems are used, they must be inspected regularly and repaired as necessary. Ten gallons per tree every ten days is sufficient on loam soils for newly planted small trees. More frequent watering may be needed on sandy or gravelly soils. In any case, the soil should be allowed to dry out somewhat between watering to encourage deep rooting, but not get so dry that new growth is interrupted.

Fertilizer is essential for rapid growth and high survival rates in most settings. Some soils are relatively fertile as evidenced by robust growth of weeds, while other sites are poor in nutrients. Soils should be tested before planting and fertilizers added according to test results. Fertilizers will increase growth of weeds as well as plantings, so weed control measures such as straw mulch will be implemented. The Creekside Way site was very low in phosphorous (2 ppm) and sulfur (1 ppm).

Because proposed geomorphic restoration (cut and fill operations) would disturb plantings, re-vegetation of areas that will be graded will not be undertaken until channel restoration work is completed. Grant proposals for geomorphic restoration will include sufficient funds for re-vegetation.

5.3 Species to be Re-Planted

Species to be planted will be taken from lists gathered in nearby reference reaches. Some of the more common native plants include: alder, arroyo willow, black willow, boxelder,

California buckeye, buttonbush, cottonwood, coyote bush, creeping wild rye, elderberry, Goodings willow, miners lettuce, mugwort, mulefat, narrow-leaved milkweed, valley oak, Oregon ash, pipevine, sandbar willow, Santa Barbara sedge, showy milkweed, California sycamore, torrent sedge, toyon, yellow willow, western redbud and wild rose. Spacing depends on budget and size of the plant at maturity. Plants of the same species typically occur in clumps and plantings can mimic natural occurrences by placing plants in groupings of three or more of the same kind. Plants are grouped by zone according to elevation above the low flow channel where they naturally occur and according to natural associations and aspect. For example, Santa Barbara Sedge is almost always found on north facing slopes in the shade of oak trees. The area of each zone will be calculated and a percentage of each species will be estimated. Species composition may be adjusted based on availability.

6 Roles and Responsibilities

6.1 City of Winters

The City of Winters has served a key role in creek restoration by co-sponsoring grants, providing funds for trail improvements, coordinating with agencies, contracting for work, and facilitating the development of the Putah Creek Master Plan. City staff person Carol Scianna has played a valuable role in assisting the WPCC by distributing agendas, preparing minutes, scheduling meetings, and communicating information amongst the agencies involved in the management of the creek. As landowner, the City will be responsible for preparing CEQA documents for any major improvements that require them, such as removal of the percolation dam and modifications to the creek channel. The City will also be responsible for insuring compliance with state and federal regulations affecting restoration work (see Appendix E).

As landowner and Lead Agency, the City of Winters should be responsible for timely advanced public noticing of “destructive” activities on or near the Putah Creek Park. These activities would include at a minimum, mature tree removal, construction of access roads, channel modifications and herbicide spraying. A plan for communicating activities to Winters residents is provided in Appendix F.

6.2 Winters Putah Creek Committee

The Winters Putah Creek Committee represents the voice of the Winters community on creek restoration and enhancement. The Committee is charged with developing this Vegetation Management Plan and will provide guidance and oversight for the implementation of the Plan. In addition, the committee is responsible for coordinating volunteer cleanups and plantings, assisting with public review of the Putah Creek Master Plan, and for advising the City Council on all other important matters pertaining to the management of the creek within Winters city limits, and the Nature Park.

As pointed out in the 1995 Putah Creek Master Plan, it is imperative that the community as a whole develop a strong sense of stewardship, and given limited resources and city manpower, volunteer participation will be necessary to insure the success and sustainability of restoration efforts. Diligent follow-up work is required to insure the survival of new plantings, and to prevent the return of undesirable plant species after their initial removal. The Committee will organize and coordinate volunteer groups to assist with plantings, installation and maintenance of irrigation systems, and weed control.

Committee volunteers can be trained and supervised in the use of herbicides to provide follow-through of restoration work by continuously controlling weeds.

6.3 Lower Putah Creek Coordinating Committee

The LPCCC has proven to be very effective at winning grant funding and is encouraged to continue to apply for funding to carry out the goals of the Putah Creek Master Plan. The LPCCC may also manage restoration work, coordinate with the City to obtain necessary permits for work to be performed, and coordinate with other agencies as needed.

6.4 Putah Creek Council

The Putah Creek Council can assist with fostering stewardship through educational and other programs such as Adopt-a-Flat, organizing community events such as cleanups and plantings, and providing input to the restoration process informed by their bio-monitoring activities, and coordinating with other groups such as the Putah Creek Discovery Corridor.

6.5 Public Participation

The WPCC encourages public participation in decisions related to vegetation management and restoration, and welcomes comments for creek restoration project phases that will be reviewed at WPCC meetings. Opportunities for public input include monthly meetings of the WPCC, participation in public meetings that may be required under CEQA, and Winters City Council meetings. The LPCCC and other grant managers are encouraged to present plans for their work at WPCC meetings and/or at other public forums.

7 Restoration Resources and Project Management

7.1 Status of Grants

Appendix G provides a listing of the status of current and pending grants and proposed grant applications.

7.2 Proposal Review and Management of Grant Project Activities

Grant proposals or proposal drafts shall be submitted to the Winters Putah Creek Committee for review prior to submission to the funding agencies, and the Committee will make recommendations to the City Council for approval (with or without modifications). The Committee will make every effort to avoid delay of proposal preparation so as to provide for timely submission. Grant project activities will be managed by the appropriate entity and monitored by the City of Winters with the assistance of the WPCC. A discussion of current and proposed grants is included in Appendix G.

8 Reference Documents

In addition to appendices, the following documents may be referenced for further information:

- 1995 Conceptual Master Plan of the Winters Putah Creek Corridor

- Lower Putah Creek Watershed Management Action Plan
- Conservation Guidelines for the Valley Elderberry Longhorn Beetle (U.S. Fish and Wildlife Service)
- Putah Creek Terrestrial Wildlife Monitoring Program 2004 and 2005 Reports
- Integrated Regional Water Management Plan for the Sacramento Valley
- Minutes of Winters Putah Creek Committee meetings and documents submitted to the committee by citizens

Appendix A: Historical Background

Systematic planning for removal of invasive weeds along Putah Creek began with a 1993 study by the U.S. Fish and Wildlife Service entitled: “Report to Congress: Reconnaissance Planning Report Fish and Wildlife Resource Management Options for Lower Putah Creek, California.” The report included maps of eucalyptus, arundo, tamarisk and tree-of-heaven as the primary invasive weeds to control. The report also identified continuity of native vegetation as a limiting factor for wildlife migration. The U.S. Fish and Wildlife Service held public meetings in Winters as part of the study.

In 1994, the Winters Putah Creek Committee was formed as a subcommittee of “Team Winters”, a group of citizens that assembled to develop a vision for revitalizing the downtown business area. The committee developed a Conceptual Master Plan for the creek, and after a series of public meetings, in 1995 the City of Winters adopted a master plan for the “Winters Putah Creek Nature Park” that addressed the need for community stewardship, removal of invasive weeds, and other issues⁴. In 1996 the Committee began removing debris, planting, and watering and the first grant money was secured. In 1998 committee chair Jessica Kilkenny turned over leadership to Jeanne Wirka, who obtained additional grant funds and organized several volunteer plantings, cleanups, and path building work parties.

With the assistance of Rich Marovich, who was hired in 2000 by the Lower Putah Creek Coordinating Committee as Streamkeeper, much was accomplished on the 100 foot easement between lots on Creekside Way and the top bank of Putah Creek. This easement was acquired by the City through a development agreement. Yellow star thistle and other weeds were replaced by creeping wild rye, coyote brush, oak, toyon, elderberry, and other native species. Replacement was supported by the installation of a drip irrigation system.

In 2001 and 2002, Solano County Department of Environmental Management held a series of public meetings in Winters that identified invasive weed control as a main objective for management of Lower Putah Creek. In 2002, the Lower Putah Creek Coordinating Committee commissioned a study by EDAW to update and expand the scope of invasive weed maps for a creek-wide Watershed Management Action Plan. The EDAW study found 113 occurrences of 12 primary invasive weeds at Winters Putah Creek Park.

By 2004 public access to the north side of the Putah Creek Nature Park was facilitated by a wide path built by community volunteers that extends from the Community Center to the sewage pumping station, and CDC crews directed by the City built access trails to the creek at points near Madrone Court and Wild Rose Lane. As a result of non-sponsored volunteer efforts and daily use, narrow paths on upper and lower terraces now extend all the way from the pumping station to the Wild Rose Lane access point. Improvements proposed by the Putah Creek Master Plan would make this path handicapped accessible.

With the departure of Wirka in 2005, restoration and improvement work came to a halt, save some voluntary plantings and maintenance by residents and vegetation removal by CDC crews. The Winters Putah Creek Committee was re-instituted by City Council Resolution 2006-46 in October 2006 to carry on the mission of enhancing the recreational and environmental value of City-owned lands along Putah Creek and Dry Creek.

⁴ Prepared by Cheryl Sullivan, this plan is currently under revision.

To improve access to the creek and clear paths for spraying invasives (particularly Himalayan blackberry and arundo), the City used CDC crews and LPCCC subcontractors to clear vegetation and cut smaller Eucalyptus trees on the north bank lower terrace of the Nature Park. Most of this work was completed in February and March of 2007.

In 2007 the LPCCC and Solano County Water Agency obtained California River Parkways (Prop. 50) and CalFed Watershed Program grants to remove the percolation dam and to conduct cleanup and restoration work on the south bank. Streamkeeper Rich Marovich has plans to apply for additional River Parkways funding for narrowing of the creek channel to create improved conditions for riparian plants and to improve the fishery.

APPENDIX B: Streamkeeper Recommendations for Herbicide Applications

In April 2007, weed control operations with Milestone Herbicide (aminopyralid) caused unexpected damage to newly sprouted elderberry plants that are host plants for the federally listed Valley Elderberry Longhorn Beetle. Milestone Herbicide is highly effective for control of thistles and other broadleaved weeds and useful for establishment of native grasses; an essential component of weed resistant landscapes. Although the affected elderberries are expected to fully recover, use of Milestone Herbicide within 20 feet of elderberries is suspended pending further studies to determine if it can safely be used in proximity to elderberries in the dormant season. Beyond 20 feet and within 100 feet of elderberries, use of Milestone Herbicide is limited to directed sprays applied with diligence to avoid drift onto elderberry plants.

Roundup Herbicide (glyphosate) has been used safely in close proximity to elderberries in the season when elderberries are fully dormant to release elderberry plants and other dormant native vegetation from competition with Himalayan blackberries and is the preferred treatment in these circumstances. Roundup Herbicide is an effective and highly selective treatment for eucalyptus as a cut stump treatment in any season using diligence to avoid exposure to elderberries.

Garlon 4 Herbicide (triclopyr) is an effective and highly selective herbicide when applied as a basal bark (band of treatment around the base of the trunk) or cut stump treatment for woody weeds. Basal bark and cut stump treatments may be applied with a paint brush or hand-held sprayer under low pressure using directed sprays and diligence to avoid exposure to non-target vegetation. Use of Garlon 4 as a basal bark or foliar treatment is limited to days when high temperatures are not expected to exceed 90 degrees. This is to avoid injury to non-target vegetation from ethylene gas, a naturally occurring plant growth regulator that is produced in response to exposure to Garlon 4 Herbicide.

Ethylene gas causes the observed symptoms of herbicide effect (hooking, wilting, defoliation and die-back). High temperatures cause high release rates of ethylene gas from treated vegetation that can (and has) damaged non-target vegetation. High release rates of ethylene gas does not occur at lower temperatures. The most effective season for basal bark treatments is in late summer, fall and winter when weeds are not actively pushing top growth. Cut stump treatments may be made in any season.

All herbicide applications will be made under the supervision of a licensed pest control operator. The person responsible for supervision shall be aware of the conditions at the site of application and be available to direct and control the manner in which applications are made (per Section 6406 of Title 3, California Code of Regulations).

APPENDIX C: Summary of Target Weeds

Arundo (*Arundo donax*): Arundo, also known as false bamboo was first introduced into the watershed in the 1960s in an effort to control bank erosion on the Pleasants Creek tributary and in the upper Putah Creek watershed. It has since spread throughout Lower Putah Creek. In WPCP there were 18 occurrences totaling just under half an acre in 2002. Some of these clumps have been treated with perhaps half of the original population remaining. Arundo is best controlled with full coverage sprays of Roundup in fall and winter months.

Black Locust (*Robinia pseudoacacia*): Black locust was introduced into the watershed by early settlers as barrier vegetation for its rapid spiny growth to 50 feet. It is widespread on Lower Putah Creek in clonal stands that sprout from root suckers and that also spread by seed. There are five occurrences in WPCP. Control is by basal bark treatment with 20 percent Garlon 4 (triclopyr) for stems under six inches or by “hack and squirt” treatment (injecting herbicide into frills cut with a machete or hatchet) in wood over six inches in diameter. There are five occurrences scattered throughout the park on both banks.

Catalpa (*Catalpa speciosa*): Catalpa is a short-lived coarse growing tree to 90 feet that has escaped from cultivation and spreads by seed. It has large leaves and is tolerant of heat. The infestation on Putah Creek is incipient with relatively few small trees that are widely scattered. There is one occurrence on the lower terrace of WPCP opposite the mid-point of the Creekside Way development.

Domestic Almond (*Prunus dulcis*): Domestic almond has escaped from commercial nut orchards and colonized lower Putah Creek especially at the top of the bank where its tolerance of summer drought has allowed it to compete with native vegetation, especially oaks and elderberry. It spreads by seed, aided by squirrels that hoard the seed in buried caches. The white blooms are conspicuous in February. There are 18 occurrence of domestic almond scattered throughout WPCP on the upper banks. It is controlled with Garlon by basal bark or frill treatment.

English Ivy (*Hedera helix*): English ivy is vine that has escaped from cultivation. It smothers the landscape with vines that climb up trees breaking down branches with the weight of the vines and eventually killing the host tree. It is a reservoir for the disease, bacterial leaf scorch (*Xylella fastidiosa*) that is harmful to oaks and other native vegetation. It is a notorious refuge for rats especially near creek channels. It is evergreen and can grow in deep shade. Birds eat and disperse the berries. There is one occurrence at WPCP below Madrone Court. Basal bark treatments with 20 percent Garlon Herbicide are effective. Repeat treatment is often required.

Eucalyptus (*Eucalyptus sp.*): Eucalyptus was introduced into California during the gold rush and probably arrived in Winters during that time. Eucalyptus was promoted for timber, fuel and windbreaks by early settlers. A 1911 postcard of WPCP has the unmistakable form of a mature eucalyptus tree in the background. The species that occurs most along Putah Creek is River Red Gum (*Eucalyptus camaldulensis*) and it is also the most widely distributed Eucalyptus in the United States and in its native Australia. Eucalyptus forms monoculture stands that are allelopathic (poisonous) to

other plants. At WPCP, beavers have attempted to use saplings even though they are not a preferred food source. This is a likely sign of starvation due to lack of other food sources. The Audubon Society considers Eucalyptus to be a sink for native birds, meaning that eucalyptus trees reduce native bird populations. In creek-wide surveys of birds by river mile, WPCP has the fewest species of birds of any reach from Putah Diversion Dam to Davis. Eucalyptus dominates the lower two-thirds of WPCP on the north bank and is the most upstream population of Eucalyptus on Lower Putah Creek, spreading seeds at high flows to all downstream sites. Eucalyptus grows very rapidly in creek channels where water is abundant and is known to grow up to 1.5 inches in diameter per year on Putah Creek. Due to its large size, it is the most costly weed to control on Putah Creek. Cost of removal is approximately \$1,000 per acre per inch of average trunk diameter up to 36 inches. Trees greater than 36 inches in diameter cost thousands of dollars each to remove. Equipment access also affects removal costs. Removal of logs is half the cost of the job, but it is often possible to find beneficial uses of the logs on site as revetments or fill. Due to the high cost of removal, eucalyptus work is best done in stages, creating access routes for equipment and removing the smaller trees so that equipment access routes are established and so that the larger trees can be surveyed and removal contractors can know exactly what the job entails. Seedlings up to three inches can be mowed. Saplings and branches up to twelve inches can be chipped. Larger wood can be used for restoration projects ideally on site or by hauling to other locations. Cut stumps and resprouts can be effectively treated with Roundup Herbicide, full strength as a cut stump treatment or as 5% solution sprayed onto the foliage. The south bank eucalyptus at WPCP was completely removed several years ago but a few seedlings apparently re-established since then. There are 17 occurrences of eucalyptus totaling 3.5 acres on the north bank of WPCP occurring mostly in monoculture stands.

Fig (*Ficus carica*) : Edible fig has escaped from cultivation and is rapidly spreading in the riparian corridor of Putah Creek, aided by fruit eating birds. On the Merced River fig has established large clonal populations from root suckers and is the most significant weed in that watershed. There are four occurrences of fig at WPCP, three on the north bank under the pedestrian crossing, the fourth on the north bank terrace below Creekside Way. There are hundreds of stems of fig on the north bank just upstream of WPCP.

Foxtail barley (*Hordeum jubatum*) is a native perennial grass that becomes weedy in neglected areas. It produces sharp awns (seeds) that lodge in the noses, ears, and feet of pets, and in shoes and socks. It is readily displaced by planting native grasses.

Himalayan blackberry (*Rubus discolor*) : Himalayan blackberry is an extremely invasive shrub that can dominate entire creek channels. It grows four to six feet high and is evergreen at our latitude. It is native to Eurasia. It spreads by underground stems, canes that touch ground or water and root, and by seeds, especially when eaten by birds. Himalayan blackberry impedes flood flows and traps sediment, elevating floodplains especially along the edge of the channel. Almost all of WPCP is lined with Himalayan blackberry along the edge of the channel. While Himalayan blackberry provides some food and shelter for birds, it also harbors rats that prey heavily on bird nests. Control of Himalayan blackberry requires high volumes of dilute (3%) Roundup Herbicide applied in winter months. This requires making trails through berry patches with an enclosed cab tractor. Himalayan blackberry will resprout in the trails because where tops are removed the plant does not absorb the herbicide. Dormant riparian vegetation is unaffected by

Roundup, even when the berries are mixed with dormant stems. Years with early and prolonged rainfall may greatly reduce or eliminate the season in which Himalayan blackberry can be selectively controlled. There are more than three acres of Himalayan blackberry at WPCP.

Milk Thistle (*Silybum marianum*.) is a winter annual herb native to the Mediterranean that grows to eight feet with white marbeling along the veins of dark green leaves that are tipped with woody spines. Milk thistle is most prevalent along the top of banks in sunny areas. Heavy infestations limit the movement of people and wildlife and displace native vegetation. Dense stands produce up to 1.4 million viable seeds per acre. Milk thistle accumulates nitrate to levels that are toxic to grazing animals. Control is most effective in the seedling stage with herbicides that provide residual control of germinating seeds. Milestone (aminopyralid) is particularly effective. Thistle control should be coordinated with native grass restoration to establish weed resistant landscapes

Pepper Tree (*Schinus sp*): Pepper tree is an escaped ornamental that is extremely invasive in Florida and Hawaii and in local areas of California. It is so far uncommon on Putah Creek. There are eight occurrences in WPCP. It can be controlled in winter with basal bark or frill treatments with Garlon Herbicide.

Ripgut brome (*Bromus diandrus*): is a winter annual grass native to Europe that has spread throughout California occupying waste places and fields at low elevation. It is commonly associated with black walnut and apparently tolerates the natural herbicide (juglone) that suppresses most other undergrowth. Ripgut brome is injurious to pets and produces awns (seeds) that lodge in shoes and socks and are difficult to remove. Control of ripgut brome is best accomplished by displacement with native grasses, especially creeping wild rye after final grade is established. Creeping wild rye can also be established under black walnut. Control is established by seeding the area to native grasses and treating with Roundup Herbicide as a broadcast spray after the brome has germinated but before the native grass emerges.

Tamarisk (*Tamarix sp.*): Tamarisk is a highly invasive coniferous shrub with magenta flowers in late March. Like arundo, it was introduced to control erosion but has taken over channels where it then induces erosion. It produces large quantities of small seeds and also spreads by root suckers. It extracts salts from the soil that inhibit other plants from growing in the vicinity. It can completely dominate creek channels. The infestation is noticeably increasing on Putah Creek. It also impedes flood flows, trapping sediment and forming mounds. There are six occurrences of Tamarisk in WPCP. It is controlled with basal bark or frill treatments with 20% Garlon 4 Herbicide or full coverage sprays of 2% Garlon 4 in fall and winter months. It can also be cut to the ground with an excavator-mounted mower and treated with 20% Garlon as a cut stump treatment.

Tree-of-heaven (*Ailanthus altissima*): Tree of Heaven was introduced by Chinese laborers at their camp sites. It is a tree to 40 feet that spreads by root suckers and seeds. It excludes all other vegetation and forms dense clumps. It grows mostly on the tops of banks and apparently does not tolerate flooding. There are 16 occurrences of Tree of Heaven totaling just under one-half acre in WPCP. Control is the same as for tamarisk.

Virginia creeper (*Parthenocissus quinquefolia*): Virginia creeper is an escaped ornamental deciduous vine that appears to have originated with a planting on Dry Creek that is rapidly spreading along Putah Creek in the Winters area. Birds spread the seed. There were two occurrences in 2002 in WPCP. Basal bark treatment with Garlon 4 Herbicide in the fall or winter is effective.

Yellow star thistle (*Centaurea solstitialis*): Native of Eurasia, yellow star thistle was introduced into California in the gold rush with the onset and spread of alfalfa production. It occurs in clearings with sunny exposures. Milestone Herbicide and Transline Herbicide (chlorypyralid) provide excellent control but resistance has been documented from repeat applications of Transline. Native grasses resist invasion by yellow star thistle once established and are the best strategy for long term control of yellow star thistle.

APPENDIX D: Map of Existing Weeds



APPENDIX E: Federal and State Laws Affecting Restoration Work

FEDERAL ENDANGERED SPECIES ACT

Pursuant to the federal ESA, the National Marine Fisheries Service (NMFS) has authority over projects that may result in take of federally listed anadromous fish species.

Similarly, the USFWS has authority over projects that may result in take of federally listed wildlife and plant species. Under the ESA, the definition of “take” is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” USFWS has also interpreted the definition of “harm” to include significant habitat modification that could result in take. If a project has a likelihood that it would result in take of a federally listed species, either an incidental take permit, under Section 10(a) of the ESA, or a federal interagency consultation, under Section 7 of the ESA, is required.

CALIFORNIA ENDANGERED SPECIES ACT

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the Fish and Game Code, a permit from DFG is required for projects that could result in the take of a statelisted Threatened or Endangered species. Under CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include “harm” or “harass,” as the federal act does. As a result, the threshold for a take under the CESA is higher than that under the ESA.

FEDERAL INVASIVE SPECIES LAWS AND REGULATIONS

Executive Order 11312 – Invasive Species (February 3, 1999) directs all federal agencies to prevent and control introductions of invasive non-native species (i.e., pest plants, animals, or other organisms) in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. Executive Order 11312 established a national Invasive Species Council composed of federal agencies and departments and a supporting Invasive Species Advisory Committee made up of state, local, and private entities. The Invasive Species Council and Advisory Committee oversee and facilitate implementation of the Executive Order, including preparing a National Invasive Species Management Plan. A number of other federal laws pertain to noxious and invasive weeds, including the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990 as amended (16 U.S.C.

4701 et seq.); Lacey Act as amended (18 U.S.C. 42); Federal Plant Pest Act (7 U.S.C. 150aa et seq); Federal Noxious Weed Act of 1974 as amended by the Food, Agriculture, Conservation and Trade Act of 1990 (Section 1453 “Management of Undesirable Plants on Federal Lands;” U.S.C. 2801 et seq); and the Carlson-Fogey Act of 1968 (Public Law 90-583). The U.S. Department of Agriculture and other federal agencies maintain lists of pest plants of economic or ecological concern.

STATE INVASIVE SPECIES LAWS AND REGULATIONS

A number of state laws and regulations pertain to preventing the spread of non-native invasive species (i.e., pest plants, animals, or other organisms). Section 403 of the California Food and Agricultural Code (FAC) directs the California Department of Agriculture (CDFA) to “prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.”

FAC Section 5004 defines a noxious weed as follows: “Noxious weed means any species of plant that is, or is liable to be, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate, which the director, by regulation, designates to be a noxious weed. In determining whether or not a species shall be designated a noxious weed for the purposes of protecting silviculture or important native plant species, the director shall not make that designation if the designation will be detrimental to agriculture.” The state-listed noxious weeds are indicated in Section 4500 of the CCR.

CDFA develops and enforces regulations created to protect California from the importation, cultivation, and spread of plant species that are deemed “noxious” by law. Plant species that have been designated as noxious weeds may be subject to various restrictions including the statutory provisions for weed-free areas, California Seed Law, and noxious weed management. Management or control activities taken against noxious weeds may both protect California’s agricultural industry and important native species.

CALIFORNIA PEST AND NOXIOUS WEED RATINGS

State-listed pests, including noxious weeds, are rated A, B, C, D, or Q based on CDFA’s view of the statewide importance of the pest, the likelihood that eradication or control efforts would be successful, and the present distribution of the pest within the state. The ratings guide CDFA, county agricultural commissioners, and others regarding appropriate actions to take. “A” ranked pests are organisms of known economic importance and are subject to state enforced actions involving eradication, quarantine, containment, rejection, or other holding actions. “B” ranked pests are similar to “A” ranked pests, but actions taken to control them are at the discretion of the individual county agricultural commissioner. “B” ranked pests also includes organisms subject to state actions and eradication only when found in a nursery. “C” ranked pests include organisms subject to no state enforced action outside of nurseries except to retard spread. “C” ranked pests are controlled at the discretion of the county agricultural commissioners. “Q” ranked pests are organisms or disorders requiring temporary “A” action pending determination of a permanent rating. The organism is suspected to be of economic importance but its status is uncertain because of incomplete identification or inadequate information. “D” ranked organisms include parasites, predators, and organisms of little or no economic importance that require no action.

Eleven invasive weed species were recently determined by CDFA to present a serious threat and are in the process of being added to the list of noxious weed species. They include the following species located within the lower Putah Creek watershed: *Ailanthus altissima* (tree of heaven); *Arundo donax* (giant reed); *Cortaderia jubata* (jubata grass); and *Tamarisk chinensis*, *T. gallica*, *T. parviflora*, and *T. ramosissima* (salt cedar). Additional invasive weeds within the watershed are already designated as state noxious weeds. The status of invasive weeds within the watershed is provided in the Invasive Weeds section in Chapter 7, “Invasive Weeds.”

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA), encoded in Sections 21000 et seq of the Public Resources Code (PRC) with Guidelines for implementation codified in the California Code of Regulations (CCR), Title 14, Chapter 3, Sections 15000 et seq.,

requires state and local public agencies to identify the environmental impacts of proposed discretionary activities or projects, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. State owned properties are subject to the provisions of Public Resources Code Section 5024 and 5024.5

Historical resources are considered part of the environment and a project that may cause a substantial adverse effect on the significance of a historical resource is a project that may have a significant effect on the environment. The definition of "historical resources" is contained in Section 15064.5 of the CEQA Guidelines.

This list is not meant to be a comprehensive and complete list of applicable environmental regulations.

APPENDIX F: Communication Plan

Purpose of this Plan

This plan is intended to:

- Keep Winters citizens apprised of restoration plans and progress
- Notify affected property owners of pending spraying, tree cutting, vegetation removal, and other large projects such as creek bed restructuring
- Notify citizens of planned cleanups, plantings, and other opportunities for volunteer activities

Responsibilities and Mechanisms

To announce plans for restoration, proposed and successful grant applications, and other news of general interest:

- The LPCCC should update the City and the WPCC,
- The City and the WPCC should coordinate preparation of press releases

When there are major restoration efforts planned such as: tree or vegetation removal, and spraying:

- The City should coordinate schedules with LPCCC and notify both the WPCC and affected property owners.
- The City should provide press releases to the Express and City Newsletter (if possible) for activities that are scheduled more than four weeks in advance.

For shorter-schedule work such as spraying and minor vegetation removal the City will distribute handbills and use phone trees and email lists to inform affected property owners at least 48 hours in advance of work. Signs to be posted in affected areas along trails and at access points will be coordinated with applicator and public works staff.

For cleanups, plantings, and similar activities the WPCC will coordinate with the Putah Creek Council and issue press releases in the Express, City Newsletter, phone trees and to email lists one or more weeks in advance.

Development and Maintenance of Contact Information

Contact information including emails will be solicited from all interested citizens attending WPCC meetings, cleanups and other sources. This contact information will include participant's preference for receiving information and notices and be used to distribute appropriate Putah Creek Nature Park project information to interested or affected parties. The WPCC will be responsible for maintaining the lists and conveying updates to the City. The LPCCC may be available to assist with these tasks.

APPENDIX G: Grant Opportunities

Current Grants

The City has grant funds remaining in the amount of \$19,900 to build trails, install signage, and construct a kiosk.

A \$1.2 million grant from the Wildlife Conservation Board that has been used for restoration work over the entire watershed expires in August 2007. Almost all of the weed removal on Putah Creek has been funded by this grant.

A California River Parkways grant in the amount of \$452,000 has been received that will fund removal of the percolation dam.

The Department of Water Resources (DWR) Urban Streams Restoration Program funded a grant in the amount of \$345,440 to restore the south bank of Putah Creek below the confluence with Dry Creek and other improvements on Dry Creek below Highway 128. An extension of this grant through May 2008 has been requested to allow installation of rock weirs and other bank-protection measures.

A proposal submitted under the Department of Water Resources CALFED Watershed program to follow-up on weed removal and other projects in the Dry Creek and Nature Park areas was approved in August 2007. The \$536,490 grant will enhance the continuity of wildlife migration corridors, deter unauthorized vehicle access, stabilize eroding banks, reduce sediment loading, deter illegal dumping and beautify the most visible reaches of Putah Creek and contiguous portions of the Dry Creek tributary by installing a 15-foot wide native vegetation hedgerow (removing weeds and infilling existing native vegetation) along three miles of south bank of Lower Putah Creek on the southern boundary of the City of Winters; and extend bank re-vegetation of Dry Creek on the southwestern boundary of Winters. The project will feature rock vanes installed by a geomorphologist, native vegetation hedgerow and oak woodland plantings on both banks.

Planned Grant Applications

One more round of funding will be available through the California River Parkways program under Proposition 50. The LPCCC intends to submit a proposal for geomorphic restoration (re-design of the creek channel) under this program. A total statewide appropriation of \$20.5 million has been proposed for 2007-8.

If the DWR Urban Streams grant is not extended, a follow up grant application could be submitted in the fall of 2007.

The California Parks Department Off-Highway Vehicle (OHV) Program funds projects to prevent damage by unauthorized use of OHVs including a past grant for vehicle barriers and restoration of areas damaged by OHVs beneath Highway 505. A new grant request for approximately \$50,000 is proposed to extend existing vehicle barriers along Putah Creek Road and to provide for more robust vehicle barrier gates where needed.

The Cal/EPA Integrated Waste Management Board Farm and Ranch Cleanup Program has provided grants for removal of solid wastes from agricultural lands along Putah Creek. The City of Winters and LPCCC are proposing a new grant for cleanup of

agricultural lands on Dry Creek below Highway 128. IWMB is also interested in sponsoring spring creek cleanup grants much like the California Coastal Commission sponsors Coastal Cleanup Day each fall.

Solano County Water Agency has budgeted \$2 million for capital improvement projects throughout Lower Putah Creek in accordance with the Lower Putah Creek Watershed Management Action Plan.