

Sonoma Creek Project
TAdN Arundo Eradication and Coordination Program
Restoration/Revegetation Plan
2005-2007

Organization Name: Sonoma Ecology Center- Sonoma Creek *Arundo* Eradication Project

I. Project Goals:

List each goal as simply and clearly as possible. A short sentence for each should suffice.

Goal #1: Eradicate *Arundo donax* and other weeds at eradication sites.

Goal #2: Protect stream banks and property from erosion.

Goal #3: Establish a multi-level vegetation structure, including stream-shading vegetation.

Goal #4: Collect seeds and cuttings for native plant propagation as close as possible to revegetation area.

Goal #5: Increase habitat for native plants and wildlife.

II. Timeline:

Revegetation Methods: Passive Active Passive and Active

III. Target Date:

Table 1: Timeline for revegetation.

| | Task |
|--------------------------|---|
| June-August 2005 | Monitor vitality of plants installed in 2004 revegetation sites. Collect and propagate native seeds. Evaluate <i>Arundo</i> occurrences for passive or active revegetation and begin developing revegetation plans for each site. |
| September-November 2005 | Collect and propagate seeds of native trees, shrubs, and grasses for planting in the winter and following year. Prioritization of sites for reveg in fall. Complete planting plans for active revegetation sites. |
| November-January 2005-06 | Install native plants at designated revegetation sites. |
| June-August 2006 | Monitor vitality of plants installed in 2005-06 revegetation sites. Collect and propagate native seeds. Evaluate <i>Arundo</i> occurrences for passive or active revegetation and develop revegetation plan for each site. |
| September-November 2006 | Collect and propagate seeds of native trees, shrubs, and grasses for planting in the winter. Prioritize sites for revegetation of new or replacement plants in fall. |
| November-January 2006-07 | Install native plants at designated revegetation sites. |
| On-going | Pursue additional funding sources to continue implementation of revegetation plans. |

IV. Existing Conditions for 35 Arundo Eradication Areas

The areas and related occurrences are described below with a brief description of the location, status of *Arundo* and other non-native plant species, and a brief description of the revegetation plan. Numerical and/or alphabetical identities are given to each area and occurrence.

Areas #1, #10, and #16: Glen Ellen Reach

(Occurrences 22, 24, 27)

Area 1=22; Area 16= 24; Area 10= 27

These areas are located in downtown Glen Ellen, off of Arnold Drive, within 100 yards of each other. Area 1 and 16 are located on Sonoma Creek, northwest of the bridge over Sonoma Creek in downtown Glen Ellen. Area 10 is located on Calabazas Creek. Each occurrence is less than 50 ft² and on the upper bank. There is non-native Himalayan blackberry and vinca at each area. Due to the small infestation size and the presence of many mature native trees in this area (cottonwood, coast live oak, California bay, and big leaf maple) that may serve as passive revegetation sources, this area will be designated as a passive revegetation site.

Areas #4, #6, and #9: Off-Stream

(Occurrences 2, 006, 26)

Area 4= 2; Area 6= 006; Area 9= 26

These sites are not located on stream channels. Area 4 is located south of Dowdall Creek, west of Arnold Drive, and north of Petaluma Avenue. Area 6 is located in a private yard off the west side of Highway 12 between Verano Avenue and Boyes Blvd. Area 9 is located at a private residence on Verano Avenue in a drainage ditch. These areas will be left to passively revegetate.

Area #17: Rancho Vista Reach

(Occurrences 001B, 002B, 003B, 004B, 005B)

Area 17 occurs on Sonoma Creek across from Riverside reach. This area is located on the upland terrace.

Occurrences 001B and 002B have been dug up due to development. Occurrences 004B and 005B are less than 100 ft² each and are near mature riparian forest. The area will be passively revegetated.

Area #11: Upper Sonoma Creek Reach

(Occurrences 28, 29)

This area is the uppermost Arundo infestation on Sonoma Creek off of Highway 12. The occurrence is small and will be passively vegetated.

Area #22, and #32: Nathanson Creek; Broadway Reach

(Occurrences 023A, 024A)

Area 22 and 23 are found along Nathanson Creek on the eastern side of Broadway, south of Napa Street. These occurrences are small (50-100 ft²) and will be passively revegetated. They are located in an urban area where the creek is channelized and has steep embankments.

Area #31 and #33: Nathanson Creek; F-OT Reach

(Occurrences 23, 31)

Area 31= Occurrence 23; Area 33= Occurrence 31

Area #31 and #33 are located on Nathanson Creek near downtown Sonoma. Both have been actively revegetated to enhance habitat and to improve landscape aesthetics after Arundo was removed.

Area #18: SDC Reach

(Occurrences 099, 099, 100)

Area 18 is located along Sonoma Creek within the Sonoma Development Center. The occurrences are located in an area where there is a lot of native vegetation and little human impact. Mature trees include willows, alder, buckeye, oaks, and bay. Himalayan blackberry and vinca are present at all patches. These patches may revegetate passively after control of blackberry and vinca.

Area #2, #3, #5, #7: Riverside Reach

(Occurrences 3, 8, 9, 13, 14, 16, 17, 19, 20, 21, 25, 27)

Area 2= 13, 14, 54, 55, 25; Area 3=9, 60, 8, 21; Area 5=59, 50, 16, 3, 20, 17; Area 7=27, 21

These areas are known as Riverside Reach and are located along a half-mile stretch of Sonoma Creek between Verano and Petaluma Avenues. Occurrences 13, 14 and, 25 are located in a county park. All other patches are on private property in an urban area. There is a mix of both native and non-native species present. Mitigation funds from a nearby development will be used to revegetate selected patches within this area based on the presence of other invasive weeds and location to native seed sources.

Area #20: Arroyo Seco Reach

(Occurrence 020A)

Area 20 is located on Arroyo Seco Creek where Eighth Street intersects with East Napa Street. There is little to no canopy cover over this section of the creek. This site will be revegetated with a few native trees, willow stakes, and a willow revetment to prevent erosion, establish native canopy cover, and to help control invasive weeds.

Area # 21: Lev Reach

(Occurrences Lev 14, ACC004, Lev015, Lev013, Lev19, Lev16, Lev17, Lev18, Lev11, Lev10, Lev009, Lev008, Lev007, Lev022A, Lev026, Lev012, Lev025, Lev025, Lev024, Lev021, Acc005, Lev028, Lev020, Acc003, Lev006, Lev023, Lev022)

Area 21 is located on Sonoma Creek between Petaluma and Leveroni Roads. The landowner, following a demonstration training by SEC staff, will treat Arundo occurrences. The type of revegetation will need to be assessed on an occurrence-by-occurrence basis. Additional funding may be needed to revegetate.

Area #34: San Reach

(Occurrences 014, 008, 003, 011, 007, 010, 006, 002, 005, 012, 004, 009, 013)

Area 34 is on Sonoma Creek, between Arnold Drive and Hwy 12 and Leveroni Road and Hwy 121. Arundo in area 34 has been previously treated by the landowner and will continue to be treated by the landowner following an SEC protocol. The type of revegetation will need to be assessed on an occurrence-by-occurrence basis. Additional funding may be needed to revegetate.

Area #25: Watmaugh Bridge Reach

(Occurrences 63A, 64A, 65A)

Area 25 is located on Sonoma Creek off of Watmaugh Road. No treatment has been done at this site yet. The type of revegetation will need to be assessed during initial assessment or treatment.

Area #36: Petaluma Reach

(Occurrence 015)

Area 36 is located on Sonoma Creek, south of Petaluma Avenue and west of Fifth Street West. The Arundo occurrence at this area will be left to passively revegetate. It is less than 100 square feet and mature native riparian vegetation is present.

Area #35 and #30: Sonoma Creekwood Reach

(Occurrences 090, 088, 035, 036, 087, 091, 037, 038, 089, 34)

Area 35= 090, 088, 035, 036, 087, 091, 037, 038, 089; Area 30=34

Area 35 is located along Sonoma Creek between Petaluma and Leveroni Roads. These occurrences of Arundo were treated with the prep-spray-and-mow method. There are large stands of dead Arundo that would make revegetation difficult. The area needs to be assessed for revegetation needs during follow-up monitoring.

Area #13: Wolf Run

(Occurrence 30)

Area 13 is located off of Warm Springs Road, north of Lake Idel and south of Graham Creek. This occurrence was treated with the prep-spray-and-mow method. There are large stands of dead Arundo that would make revegetation difficult. Area needs to be assessed for revegetation needs during follow-up monitoring.

V. Permitting:

The Sonoma Ecology Center has a Stream Alteration Agreement (DFG 1600) that authorizes the eradication and revegetation activities. Programmatic permitting will be coordinated by EDAW, Inc. to obtain permit authorization from regulatory agencies to comply with CEQA and NEPA for Arundo removal, native plant revegetation, and minor bank stabilization.

VI. Site Preparation:

Intensive site preparation will not be necessary. Arundo biomass will be removed during cut-stump eradication, but will be left standing or in mulch piles after prep-and-spray applications. Dead Arundo stalks may need to be cut and removed or piled at sites treated with the prep-and-spray method. The eradication of non-native weeds—especially Himalayan blackberry, vinca, hemlock, fennel, mustard, wild radish, and annual grasses around Arundo patches—may increase the survival rates of native seeds and saplings. Revegetation will be focused on areas of bare soil, and in and around Arundo patches.

VII. Revegetation Plan:

In general, revegetation is done at an occurrence-by-occurrence basis depending on site-specific conditions. Revegetation methods are determined by the size of the patch, its position on the bank, the presence or absence of erosion, the presence or absence of non-native weeds, and the site's proximity to native plant propagule sources.

Native plants will be propagated by the Sonoma Ecology Center's Native Plant Nursery. Grass seed to be used for direct sowing may be purchased from an accredited grower (such as Hedgerow Farms, 530-662-4570) with seed preferably collected from Sonoma or Napa Counties. All seed or cuttings collected by SEC will be collected as close as possible to the revegetation area, preferably from the revegetation site area or from the same creek or tributary.

A planting and management plan will be developed for each actively revegetated area. Plan development will begin after the initial survey of each site. Each plan will include a plant list, timeline, budget, and monitoring and maintenance schedule for at least two years, and a site sketch illustrating the layout of native plants to be installed. A sample planting and management plan can be provided upon request. Below is a list of the revegetation activities that will occur in each Arundo area.

| Area # | Passive Revegetation | Active Revegetation | Reveg assessment to be done at time of treatment or initial assessment |
|--------|----------------------|---------------------|--|
| 1 | X | | |
| 2 | | X | |
| 3 | | X | |
| 4 | X | | |
| 5 | | X | |
| 6 | X | | |
| 7 | X | | |
| 8 | | X | |
| 9 | X | | |
| 10 | X | | |
| 11 | | X | |
| 12 | | X | |
| 13 | X | | |
| 14 | | | X |
| 15 | | | X |
| 16 | X | | |
| 17 | X | X | |
| 18 | X | | |
| 19 | | | X |
| 20 | | X | |
| 21 | | | X |
| 22 | X | | |
| 23 | X | X | X |
| 24 | X | | |
| 25 | | X | |
| 26 | X | X | |
| 27 | X | | |
| 28 | X | | |
| 29 | X | | |
| 30 | X | | |
| 31 | | X | |
| 32 | X | | |
| 33 | | X | X |
| 34 | X | | X |
| 35 | | X | |
| 36 | X | | |

Below is a list of plants commonly used for riparian revegetation.

| Common Name | Scientific Name | Source | Planting Area |
|--------------------|---------------------------------|--------------|--------------------|
| Willow | <i>Salix spp.</i> | Sprigs | Toe to Mid-Bank |
| California Buckeye | <i>Aesculus californica</i> | Seed | Upland |
| Coast Live Oak | <i>Quercus Agrifolia</i> | Seed | Upland |
| Fremont Cottonwood | <i>Populus fremontii</i> | Sapling/Seed | Toe to Upper Bank |
| White Alder | <i>Alnus rhombifolia</i> | Seed | Toe to Mid-Bank |
| Elderberry | <i>Sambucus mexicana</i> | Seed | Upland |
| Spicebush | <i>Calycanthus occidentalis</i> | Seed | Upland |
| California Bay | <i>Umbellifera californica</i> | Seed | Upland |
| Oregon Ash | <i>Fraxius latifolia</i> | Seed | Toe to Upper bank |
| Blue Wildrye | <i>Elymus glaucus</i> | Seed | Mid-Bank to Upland |
| Snowberry | <i>Symphoricarpos rivularis</i> | Seed/Cutting | Upland |
| Big Leaf Maple | <i>Acer marcophyllum</i> | Seed | Toe to Upper Bank |
| Toyon | <i>Heterometes arbutifolia</i> | Seed | Upland |
| Coyote Bush | <i>Baccharis pilularis</i> | Seed | Upland |

VIII. Revegetation Methods

Passive Revegetation

Generally smaller patches (1 to 50 canes) and patches near large stands of native vegetation that are not at risk of erosion will be left to revegetate on their own. These patches will be monitored for the establishment of non-native vegetation, and eradication methods will be used to control non-native plants in and around the patches.

Active Revegetation

Active revegetation will occur at Arundo eradication sites that are near or downstream of invasive plant species (such as vinca, ivy, blackberry, or tree-of-heaven) where the soil or bank is at high risk of erosion, or where the landowner desires replacement vegetation.

Upland Shrubs and Trees

Shrubs and trees listed in Table 3 will be planted from seed, cuttings, or saplings from a source as close as possible to the site being revegetated. The shrubs and trees will be planted in the fall. Cuttings and saplings will be planted when rainfall has moistened the soil to a depth of 10 inches. Shrubs and trees will be planted on the upland terrace and upper bank. Alders, cottonwoods, maples, and ash may be planted from the toe to mid-bank.

Grasses and Sedges

Grasses will be planted or seed will be sown in fall from mid-bank to upland terrace. Sedges will be planted in fall from toe to mid-bank.

Willow Sprig Planting

Willow sprigs will be planted in fall from the toe to mid-bank with a two-foot spacing between sprigs. The sprigs should be 2 to 4 feet long and 1 to 3 inches in diameter. Harvesting of sprigs should occur no sooner than three days before planting. If not collected on the same day as planting, sprigs will be stored in a holding pond. See Appendix A for details.

Willow Revetment

Willow revetments (see Appendix B) will be used where there is serious undercutting and bank stabilization is needed.

IX. Maintenance:

Maintenance will include removal of invasive weeds in all revegetation areas by mechanical or chemical control methods. Each revegetation area will be watered by hand or with the installation of irrigation if possible. We also may install protective cages around plants when herbivory is a problem. Planting in the fall will also help native plant establishment. A planting and management plan will be completed for each actively revegetated site, which will outline a maintenance schedule including weeding, watering, and monitoring. A sample can be provided upon request.

X. Monitoring and Success Criteria:

Areas will be monitored once in spring, summer, and fall to evaluate and treat secondary weeds, to monitor plant vitality, and to detect any erosion problems. Monitoring of native plant vitality will occur in June through August. Secondary weed monitoring and treatment will be done once in spring (March-May) and again in

summer (June-August) to more successfully monitor and treat weeds in different growing seasons. Information collected will be used to evaluate the planting and management plan and adapt it, where needed, before the next planting season in order to maximize native plant establishment.

The following criteria will be used to evaluate the success of this plan:

- 50% survival of plantings
- >80% canopy cover from willow sprigs
- <10% bare soil

XI. Responsibilities:

| Type of Specialist | Name | Address | Phone |
|----------------------------|-----------------------|------------------------------------|--------------|
| Biologist/Vegetation mngr. | Sonoma Ecology Center | 205 First St West Sonoma, CA 95476 | 707-996-0712 |

Tasks: Collect seeds, cuttings, and saplings; oversee revegetation work to ensure that it is done according to revegetation plan; monitor sites for erosion during rainy season and plant mortality in summer; plant native trees, shrubs, and grasses; coordinate volunteers for planting, seed collection, and propagation. On-staff geomorphologist, Lisa Micheli, and biologist, Caitlin Cornwall, will consult on revegetation projects.

XII. Cost Analysis:

Revegetation costs are extremely variable depending on the needs of the site, size of the area planted, intensity of planting, and the labor source. A budget will be prepared for each revegetation area on a site-by-site basis as part of the planting and management plan. The following activities will be budgeted for: site preparation (labor and equipment), maintenance and monitoring for at least two years, plants, erosion control materials, plant protection materials, and overhead/ administration.

XIII. Appendix:

Willow staking and revetment protocol (Source: California Department of Fish and Game)

XIV. Additional Resources:

CNPS- Milo Baker Chapter of the California Native Plant Society, at <http://www.cnpsmb.org/>
 Circuit Rider Productions at, www.crpinc.org or, 9619 Old Redwood Hwy Windsor, CA 95492, (707) 838-6641, Karen Gaffney, Restoration Projects Manager
 Sonoma State University- Native Plant Nursery, at www.sonoma.edu/ensp/, or 1801 East Cotati Ave., Rohnert Park, CA 94928, (707) 664.2306, Karen Tillingast, Nursery Manager
 Sonoma County Water Agency- Sonoma County Water Agency, at www.scwa.ca.gov/, or P.O. Box 11628 Santa Rosa, CA 95406, 707-526-5370
 Ellie Insley & Associates, at P.O. Box 2044 Glen Ellen, CA 95442, (707) 933-0509
 Society for Ecological Restoration, California Chapter (SERCAL), at www.sercal.org or SERCAL, 915 L Street #c104, Sacramento CA 95814, (805) 634-9228.