

Section 5: Project Description

- 1. Project Objectives:** Concerned Resource and Environmental Workers (The C.R.E.W.) proposes to restore the riparian ecosystem of the upper San Antonio Creek. This portion of the San Antonio creek will encompass three distinct corridors totaling 6.11 acres. The first corridor is a riparian area. The second corridor consists of coastal sage and scrub brush. The third area is a woodland/grassland corridor. Throughout each of these corridors, there are many invasive trees and plants such as Mexican Fan Palm, Eucalyptus and Tree-of-Heaven and Peruvian Pepper. C.R.E.W. workers, professional restoration biologists and community volunteers will remove these non-native invasive plants and trees in the corridors, as well as re-vegetate and restore the creek with native plants and trees. This area is heavily populated with the invasive and harmful Tree-of-Heaven (*Ailanthus altissima*). This project will conduct measures to control the spread of this tree and other invasive plants, thereby achieving net GHG reductions. In addition, project workers will remove trash and debris to restore flows which will improve the hydrologic capacity of the stream, open up the in-stream channel for rearing habitat and provide light to tree seedlings sprouting along the canopy understory. These habitat improvements will also benefit the flora and fauna of the area which has also suffered from continuous and long term invasive plant intrusion and would positively influence downstream aquatic habitats as well.
- 2. Background and Conceptual Models:** The project site is approximately 6.11 acres and contains 908 feet of linear streambed. There are over 200 Mexican Fan Palm trees, 500 Tree-of-Heaven and several large Peruvian pepper and Eucalyptus trees. These non-native trees sequester less GHG than native trees. Mexican Fan Palm and Eucalyptus trees consume more water than native trees. Tree-of-Heaven sequesters less GHG due to their

dormancy during part of the year. Additionally, Tree-of-Heaven is highly invasive to surrounding vegetation and is a prolific seed producer. Controlling these trees will allow for native trees and vegetation to populate and effectively reduce GHG emissions. Native trees have far greater carbon sequestration ability than the palm trees, Eucalyptus, Tree-of-Heaven and Pepper as they contain much greater photosynthesizing biomass. Additionally, albedo is increased with natural openings in the tree canopy, and with greater reflectivity of solar radiation overall temperature in the riparian area will likely decrease. Decreased temperature, greater solar reflectivity and less available CO₂ has important implications for slowing climate change.

The County of Ventura completed a restoration project near the woodland/grassland corridor and this project will expand on the previous work.

A quantitative model of CO₂ sequestration is provided in Section 6 of this document that depicts the effects of CO₂ sequestration for the first year of the project. The net effect of that worksheet is:

Pounds of CO₂ Sequestered during the first year: 9,037
Total pounds equivalent CO₂ sequestered during the first year: 33,166
Equivalent CO₂ sequestered in short tons during the first year: 16.58

By using the Department of Energy's reference document (used to build the table) we can project out 5 and 10 years to see the positive effects of GHG reduction of this project. Calculated data shows the following results:

Pounds of CO₂ Sequestered at 5 years: 11,815 (30% inc)
Total pounds equivalent CO₂ sequestered at 5 years: 43,361 (30% inc)
Equivalent CO₂ sequestered in short tons at 5 years: 21.68 (30% inc)

Pounds of CO₂ Sequestered at 10 years: 14,784 (64% inc)
Total pounds equivalent CO₂ sequestered at 10 years: 54,267 (64% inc)
Equivalent CO₂ sequestered in short tons at 10 years: 27.13 (64% inc)

- Detailed project description, including all tasks to be performed:** The C.R.E.W. proposes to restore the riparian ecosystem of the upper San Antonio Creek. The C.R.E.W. will use approximately 75 workers and 35 community volunteers under the auspices of training by professional restoration biologists to remove non-native invasive plants and trees in the three corridors, as well as re-vegetate and restore the creek with native plants and trees. This area is severely overgrown with Mexican Fan Palm (*Washingtonia robusta*), Eucalyptus, Tree-of-Heaven (*Ailanthus altissima*) and Peruvian Pepper species that are highly invasive to surrounding vegetation. The C.R.E.W. proposes to remove over 300 Fan Palm, Pepper and Eucalyptus trees and remove/control the rapid spread of approximately 500 Tree-of-Heaven that will serve two purposes. First, by controlling the spread of this tree, other native trees and vegetation will be allowed to populate. This will achieve an increase in the reduction in the amount of GHG. Secondly, the Tree-of-Heaven is a prolific seed producer. By controlling the tree population, seed production is greatly reduced and downstream pollution is greatly lessened and will enhance the creek and adjoining ecosystem as well as improve passage and breeding potential for endangered aquatic species such as the southern steelhead trout and the California red-legged frog. Removal of this tree will also allow for a significant increase in the native plant population, improve

hydrologic capacity of the stream, as well as provide light to tree seedlings sprouting along the canopy understory.

As a collaborative effort with the Ojai Valley Land Conservancy, Channel Islands Restoration, Pax Environmental and local area schools, The C.R.E.W. proposes to restore the riparian ecosystem of the upper San Antonio Creek. Recently detailed GIS mapping with Trimble revealed that the project will restore approximately 908 linear feet of stream, totaling 6.11 acres of riparian habitat. Site preparation, restoration implementation, planting and maintenance plans have been developed as part of the project.

With the support of CDFW, The C.R.E.W. and its biological consultants are currently working with the Ojai Valley Green Coalition, the Ojai Valley Land Conservancy and the City of Ojai to restore the lower Stewart Canyon Creek and the West Barranca, upstream of Stewart Canyon. All of these areas are particularly important areas to restore because they are the next downstream sections of the creek before joining the lower San Antonio Creek (where the County of Ventura and The C.R.E.W. are currently engaged in Arundo removal and restoration). If the Upper San Antonio Creek is not restored and the Tree-of-Heaven controlled, the lower reaches of Stewart Canyon Creek and San Antonio Creek can be impacted by downstream transport of non-native seeds and rhizomes. Restoration of the upper San Antonio Creek will connect the restoration efforts of The C.R.E.W. and the Ojai Valley Land Conservancy, opening habitat and creating a greater wildlife corridor.

For this project, The C.R.E.W. will be teaming with professional ecologist Brian Holly, Pax Environmental, Inc. and Channel Islands Restoration. The project will provide environmental training and paid employment to an estimated 75 predominantly low-income and at-risk local youth, as well as employment/intern opportunities to about 5 college students.

There will also be an educational focus of this project with local volunteers and local schools. We will use volunteers to help measure the effect of GHG reduction by involving them in the planting process, helping determine canopy cover and diameter breast height (DBH) of new and existing trees, publishing these results and helping make the public aware of this process and the effects it has on the local environment. This educational piece is a reason why we intend to apply for the Five Star and Urban Waters Restoration Program grant through the National Fish & Wildlife Foundation.

Our Project Ecologist has initiated preliminary discussions with California Department of Fish and Wildlife for this proposed project. We have prepared a draft restoration work plan that will include the following tasks: obtaining additional permits (if applicable) from Ventura County Watershed Protection District, CDFW for clearing non-native plant species, re-vegetation of native riparian plants and maintenance over five years.

Tasks:

1. Site preparation – all non-native trees scheduled for removal will be flagged or otherwise identified prior to removal. A biologist or certified arborist will confirm the trees to be removed prior to any cutting taking place. Only hand tools and small power tools such as chainsaws and weed whips will be used. All native trees will be protected at or outside of the critical root zone. If trees are removed during the general bird nesting season (Feb15-Sep15), a qualified biologist will conduct nesting bird pre-construction surveys or monitoring to ensure protection to bird species per

the SAA and the Migratory Bird Treaty Act.

2. Plant removal – only non-native plants and trees designated for removal will be removed. We will protect existing trees and other vegetation expected to remain in place against unnecessary cutting, breaking, skinning or bruising the roots and bark. To prevent damage to the root system we will use only hand methods for clearing and grubbing inside of drip line of trees expected to remain. Tree-of-Heaven is highly adaptable and can grow under limiting or harsh conditions such as soils that are saline, nutrient poor or highly compacted. It also grows in areas affected by heat, drought or pollution. Chemicals in their leaves, bark roots and seeds inhibit growth and germination of surrounding plants. It is difficult to control these trees by simple cutting as these trees re-sprout with vigor and massive root suckering occurs which in some cases results in more new stems spreading over a wider area. To effectively control, methods will be used that prevent establishment in new areas and small infestations will be treated and controlled. Management efforts will focus on treatments that stress the root system and lead to a reduction of seed production. Since Tree-of-Heaven is relatively shade intolerant, we will seek to establish desirable competing trees and shrubs following control efforts. Since this species is difficult to control, measures will take more than two or more years to control.
3. Planting – the planting plan for this project incorporates a continuation of container plants, cuttings, seeds and native non-invasive plants to create the basic structure of desired native habitat consistent with the California Department of Fish and Wildlife California Salmonid Stream Habitat Restoration Manual. A conceptual planting plan is being developed for this project and is included with this application. The restoration area will be planted using standard horticultural practices. It is preferred that the source of all seed, cuttings and container plants used at the restoration will be from the vicinity of the project.
4. Maintenance – maintenance activities during the maintenance program include contractor education, irrigation management, trash removal, hand removal and access control. Watering of new planting will be carried out twice weekly each year from May through September. Management of Tree-of-Heaven will be done in accordance with established methods of control.

4. **Timeline:** project schedule

September 2015: if awarded, begin site preparation

September-December 2015: non-native tree and plant removal. Commence Tree-of-Heaven control measures.

January-February 2016: begin native plant installation and seeding. Follow-up removal of non-natives

March-September 2016: follow-up maintenance and non-native removal. Control measures for invasive trees

October 2016-February 2017: plant native plants and seed

March 2017-March 2018: follow-up maintenance and hand irrigation

5. **Deliverables:** This project is expected to greatly reduce GHG emissions, increase the overall health of native trees and plants and enhance the riparian ecosystem. It will improve the passage and breeding potential for endangered aquatic species and improve water quality as part of a bio-swale concept. Removal of non-native plants and trees will allow for a significant increase in the native plant population, improve hydrologic capacity of the stream, open up the in-stream channel for rearing habitat and provide light to tree seedlings sprouting along the canopy understory.

The environmental goals of the restoration plan are to reduce the effects of green house gases (GHG's). It will also provide co-benefits such as enhancing fish and wildlife habitat, protecting and improving water quality and quantity and helping the State of California adapt to climate change. It will be done by re-establishing a functioning wetland and riparian ecosystem, removing non-native species in phases by canopy descending order, control management of non-native species, plant and irrigate native riparian species in areas with sparse vegetation throughout the project site after non-native removal is completed, restore function of low flow channel by removing litter, rubble and provide ongoing stewardship of the creek area.

Deliverables:

- Restoration of approximately 908 linear feet of stream totaling 6.11 acres of riparian habitat.
- Approximately 2,000 plants, trees and cuttings will be planted throughout the site.
- Removal of over 200 palm, 500 Tree-of-Heaven and an estimated 75 Eucalyptus and Peruvian Pepper trees.
- Provide training and project employment to an estimated 75 at-risk or low-income local youth ages 14-21 and to create stewards of the wilderness among them, while providing over 9,000 hours of paid employment, provide employment/intern opportunities for two and four year college students, create paid and unpaid internships, provide work site training for youth new to environmentalism or to the workforce, and to develop outreach and networking that will help to continue project funding from a variety of community based sources.
- Educate the general public about the causes and effects of GHG reductions

6. Expected quantitative results (project summary):

URBAN FORESTRY CARBON SEQUESTRATION WORKSHEET								
Species Characteristics			Tree Age (years)	Number of Age 0 trees Planted	Survival Factor	Number of Surviving Trees (column b x c)	Annual Sequestration Rate (lbs/tree)	Carbon Sequestered (lbs) (Column d x e)
Column			A.	B.	C.	D.	E.	F.
Name	Tree Type	Growth Rate						
Quercus agrifolia (Coast Live Oak)	Hardwood	Fast	0	150	0.873	130.95	2.7	353.57
Platanus occidentalis (Sycamore)	Hardwood	Fast	0	100	0.873	87.30	2.7	235.71
Juglans nigra (Black Walnut)	Hardwood	Fast	0	75	0.873	65.48	2.7	176.78
Populus deltoidus (Cottonwood)	Hardwood	Med	0	75	0.873	65.48	1.9	124.41
Quercus agrifolia (Coast Live Oak)	Hardwood	Fast	150	N/A	N/A	10	150.6	1,506.00

Quercus agrifolia (Coast Live Oak)	Hardwood	Fast	40	N/A	N/A	45	93.2	4,194.00
Platanus occidentalis (Sycamore)	Hardwood	Fast	30	N/A	N/A	32	65.9	2,108.80
Populus deltoidus (Cottonwood)	Hardwood	Med	15	N/A	N/A	20	16.9	338.00
Total Pounds of Carbon Sequestered								9,037.27
Total Pounds of Equivalent CO2 Sequestered x 3.67								33,166.78
Equivalent CO2 Sequestered in Short Tons /2000								16.58
Reference: U.S. Department of Energy, <i>Method for Calculating Carbon Sequestration by Trees in Urban Settings</i>								

The above chart represents the amount of carbon sequestration that is predicted for this project after one year as a result of restoration activities. There are Coastal Live Oak, Sycamore, and Cottonwood trees in the project site that have been cataloged and based on empirical data the amount of carbon sequestered has been calculated based on their estimated age. The carbon sequestration estimates for the tree planting that will take place throughout the grant period have also been calculated. We based the tree age at zero years to reflect the first year of planting. The survival rate and annual sequestration rates were taken directly from the reference document. The future effects of CO2 sequestration will change each year based on tree age and annual sequestration rate data. This data represents the first year and it is anticipated that these numbers will increase each year. (See projected data section on page (A4). There are some uncertainty factors that may affect these figures. The drought uncertainty will affect the survivability rates of trees. By removing invasive tree species that consume large amounts of water, more water will be available and the chances of survival are increased. It will also be important during the maintenance period to control the re-growth of invasive plants and trees. An adequate maintenance plan has been drafted to mitigate this re-growth to ensure a healthy project area. Methane and nitrous oxide measurements are not included in these calculations as this is a project site outside of city limits and there are no buildings or structures currently existing or planned for the future.

- 7. Protocols:** Once the initial tree planting has been accomplished, we will establish baseline tree data for the area. Each year as part of deliverables, we will calculate the potential carbon sequestration of the trees at the project site. We will use a couple of different methods as part of our educational and volunteer outreach efforts with the local community. We will use GIS map overlays and aerial photographs to document the area. With the help of arborists and volunteers, a color-coded system can be used on these overlays to establish different land cover categories. Results will be summarized and made available for public access. Separately, we will measure the diameter breast height (DBH) of each tree as well as use a spherical densitometer to measure canopy density. These measurements will be used to calculate potential CO2 sequestration. We can then compare results with published research data and document and report our findings.

Additionally, the co-benefits will also be evaluated using CDFW established protocols as defined in the California Salmonid Stream Habitat Restoration Manual.

- Restore 908 linear feet of stream, totaling approximately 6.11 acres of riparian habitat
- Approximately 2,000 plants and several hundred native cuttings will be planted throughout the site
- Remove approximately 200 Mexican Fan Palm, 500 Tree-of-Heaven and 75 Peruvian Pepper and Eucalyptus trees from the site
- Monitor the effects of invasive plant removal pertaining to increased native vegetation growth, creek water flow, water quality and increase in aquatic species.

8. **Literature Cited:**

United States Department of Agriculture TP-R3-16-9 *Field Guide for Managing Tree-of-Heaven in the Southwest*

United States Department of Energy, *Method for Calculating Carbon Sequestration by Trees in Urban and Suburban Settings*

The Finnish Society of Forest Science, *Estimation of Forest Canopy Cover: a Comparison of Field Measurement Techniques, 2006*

The Royal Society Publishing, *Assessing Current and Projected Suitable Habitats for Tree-of-Heaven Along the Appalachian Trail*, published April 14, 2014

San Bernardino Mountains Range Invasive Plant Removal Project October 15, 2012

CDFW *California Salmonid Stream Habitat Restoration Manual*