CUYAMACA RANCHO STATE PARK

REFORESTATION PROJECT

PROJECT DESIGN DOCUMENT

Submitted for Initial Verification

Under Climate Action Reserve's

Forest Project Protocol 3.2

April 30, 2012

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The Project Design Document for the Cuyamaca Rancho State Park Reforestation Project has been written to meet the requirements for initial verification as described in the Climate Action Reserve's Forest Project Protocol, version 3.2 (FPP 3.2). It contains narrative to describe management goals, location, boundaries, eligibility, activities, secondary effects, additionality, monitoring, and reporting. The document includes 18 maps and 14 exhibits which provide supporting materials for the key project components. As a reference, all information required in the Project Design Document is found in Section 9.1.1 of FPP 3.2.

This document has been prepared by staff at the Colorado Desert District of California State Parks with the assistance and guidance of two project consultants, Tim Robards (RPF #2521) and Nancy Budge. Contacts for questions or further information about this project are as follows:

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All maps are in an 8" by 11" pdf file format. For larger versions with higher resolution, please contact L.Louise Jee at the Colorado Desert District Office of California State Parks, lljee@parks.ca.gov , (760) 767-4381

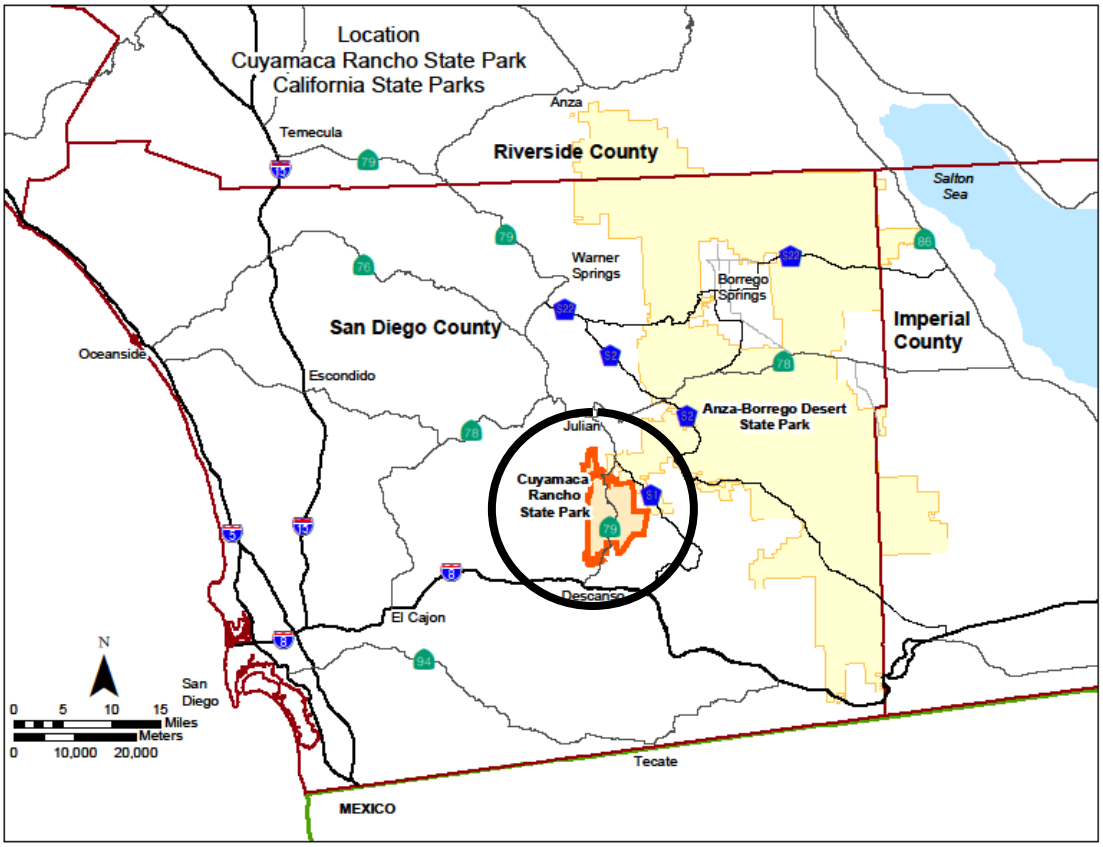
LIST OF EXHIBITS

A. Project Summary and Goals

Summary

The goal of the Cuyamaca Rancho State Park (CRSP) Reforestation Project (Project) is to restore the park's conifer forest—95% of which was destroyed by the catastrophic 2003 Cedar Fire--to conditions of a diverse native forest favorable for wildlife habitat and resistant to catastrophic fire events. The Project will also provide long-term climate benefits. The project consists of a planned replanting of approximately 2,530 acres (1,023 ha) in the 24,768 acre (10,023 ha) park, in dispersed patches designed to advance restoration of the conifer forests over time. The final planted acreage figure will depend on factors such as survivability, site suitability, costs, etc. but will not exceed the maximum of 5,664 acres (2,292 ha) defined as the provisional Project Area. The final Project Area acreage will be confirmed and verified during the second site verification. See Section B for more details.

CRSP is located 40 miles (64 km) east of San Diego on Highway 79 in San Diego County, California, within the Peninsular Range of mountains with elevations ranging between 3,400 feet (1036 m) and 6,500 feet (1981 m).



In October of 2003, the Cedar Fire burned over 270,686 acres (109,543 ha) in Southern California including almost the entire CRSP (CAL FIRE, 2011). This was the largest fire in California as recorded by fire perimeter maps which have been used to document the extent of burned areas since the early 1900's. Conifer mortality in the park was extremely high (>95%) due to the fire severity and high temperatures which resulted in very low seed cone survival.

Post-fire vegetation is dominated by herbs, shrubs and re-sprouting oak species. Conifer forest appears to be regenerating at only a small fraction of its pre-fire density. The conifer forest historically present in the park is considered to be an important habitat for the region. Occurring in "sky islands" on higher elevation peaks in the park, the forest contains a rich diversity of species. The 2003 Cedar Fire affected large proportions of these relatively small, forested areas. The goal of the Project is to restore the biodiversity and ecosystem functioning of these sky islands in a way that protects them from the threats of damaging wildfire, disease and invasive exotics.

Jeffrey Pine Seedling – Part of 2009 Planting
(photo: Nancy Budge)

Regeneration of Conifers

The Project consists of planting of 2,530 acres of former forest lands in a series of patches that mimic recovery of a landscape burned in a more "natural" and less intense fire. These patches, representing approximately 25% of the burned acreage formerly in conifer forest, will become centers for seed dispersal, and are expected to speed further recovery of the larger conifer forest. The targets for recovery in these patches are as follows:

Tree Density: The target for tree density is a pre-fire suppression era (before the 1930's) canopy cover of approximately 40% to 60%. Tree density changed from an average of 47% cover in 1928 to 89% in 1995 with the implementation of fire suppression management (Goforth and Minnich, 2008). The target basal area at maturity is a forest with roughly 100 square feet per acre across a range of diameter classes which approximates what was found 75 years ago before the effects of fire suppression management. This is in contrast to the more immediate pre-Cedar Fire condition which was on the order of three times that amount (Weislander, 1935; Zedler and Krofta, 1996; Goforth and Minnich, 2008). These targets may vary depending on climate or other factors; and will vary spatially across the landscape.

Stand Composition for Trees: The target is to recreate a composition similar to conditions before the fire suppression era with a higher proportion of pines than was present in the last decades. Studies show that the higher densities of the 1990's were mainly the result of an increase in small diameter class, shade-tolerant incense cedar and white fir (Zedler and Krofta, 1996; Goforth and Minnich, 2008).

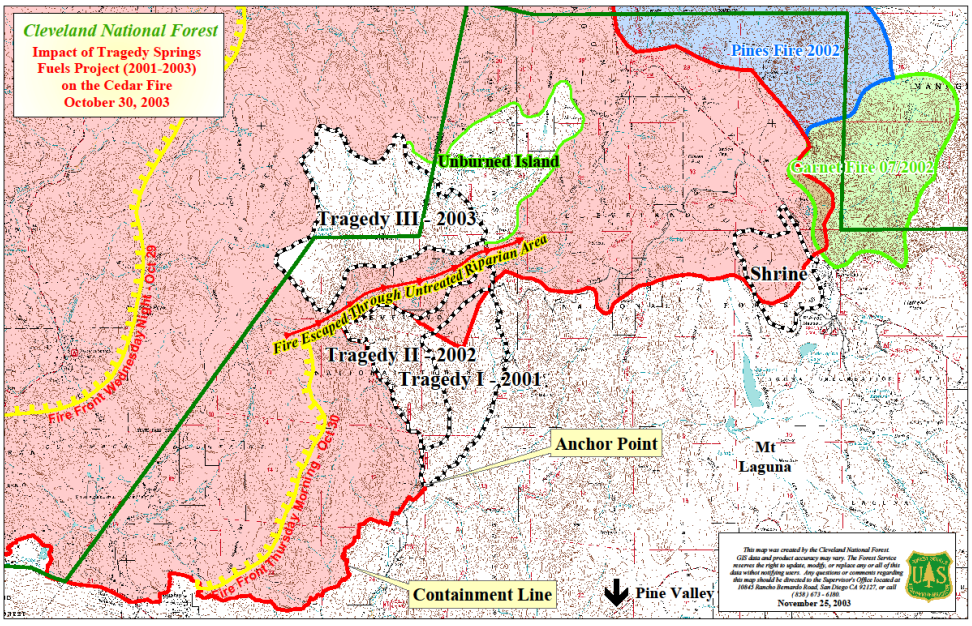
Stand Composition for Brush and Native Annual Grasses: The target of the Project is to reduce shrub and annual grasses within the planting area to below 20% over time. In some of the stands surveyed post-fire, *Ceanothus palmeri* increased from 3% to 31% and the cover of annual grasses increased from 3% to 40% (Franklin, 2008). It is expected that some of the dense *Ceanothus palmeri* stands will undergo self-thinning (Franklin, 2008). In many of the non-project areas of the park, ceanothus will continue to be abundant. The Project includes a study to determine the role of *Ceanothus sp*. as nitrogen fixers which can be important to ecosystem recovery following nitrogen volatization by fires (Binkley et al., 1982).

Habitat Restoration

The Project is designed to restore a mosaic of native plant communities represented within the park and thereby improve native wildlife habitat and wildlife diversity. Bird surveys after the 2003 Cedar Fire indicate significant disruption of rare birds such as California spotted owl, red-breasted sapsucker, red-breasted nuthatch, and golden-crowned kinglet. The 3-5 pairs of California spotted owls (currently listed by the U.S. Forest Service as a Sensitive Species) previously known to be present in the park have not been seen since the fire. Populations of small non-migratory birds like the mountain chickadee, California thrasher and rarer species such as dusty flycatcher, yellow-rumped warbler, green-tailed towhee, and fox sparrow are under pressure due to the small amount of mountain-top forest habitat that remains in the park. In addition to restoring live forest cover, the Project will retain selected snags and downed dead trees as wildlife habitat.

Address Fire Management Issues

The Project will incorporate activities to reduce the future chances of catastrophic, habitat type-conversion wildfires in the Project Area. This will include vegetation management work, periodic thinning, and prescribed burning that tie in with overall park management goals for reduction in fuels. The post 1950s era fire suppression management caused increases in stand density and a shift in composition from fire-tolerant trees such as Jeffrey pine, Coulter pine, and Ponderosa pine, to shade-tolerant trees such as incense cedar and white fir (Franklin et al., 2006). Although the planned treatments raise the overall project costs, these activities are critical in order to lower the future risks of destruction of forests and forest habitat, and improve safety for public and staff. Past fire management activities have had positive results. Surveys from sampling in the East Mesa showed a marked contrast between a 521 acre (211 ha) area, known as Tragedy Springs, where a prescribed fire was conducted in early June 2003, and the rest of the East Mesa area where the forest burned at moderate to high severity levels (USFS, 2005). In the prescribed burn area, the fuel loads were decreased by 40% to 80%. As a result there was lower mortality of both oaks and conifers during the Cedar Fire within the perimeter of the Tragedy Springs prescribed burn area (Franklin et al., 2006).



Map showing the "Tragedy Springs" Hazardous Fuels Reduction Project's Role on the Eastward Spread of the 2003 Cedar Fire.
(credit: Cleveland National Forest Web Site: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5294878.pdf)

Address Exotic Species

The Project will assist in preventing the spread of invasive weeds. Restoration of the forest canopy will reduce shade-intolerant exotics such as *Bromus tectorum* (cheatgrass)*, B. diandrus* (ripgut brome)*,* and other invasive, non-native grasses, which are unlikely to persist in continued great abundance after 5-10 years (Franklin et al., 2006).

Bromus tectorum (cheatgrass)
(photo: Leslie J. Mehrhoff)

Other Project Goals

By accelerating forest recovery, the Project is expected to reduce erosion risks, which will protect watershed function, cultural sites, and natural vegetation of the park. Improved aesthetics and reforestation will also enhance recreation values, such as camping, hiking, equestrian use, and mountain biking. It will also serve an education role for the more than 400,000 annual visitors and the onsite Cuyamaca Outdoor School Camp operated by the San Diego County Office of Education.

Further, the Project will facilitate additional research opportunities, such as studies of seedling survival and the role of ceanothus in soil restoration by the University of San Diego. San Diego State University, University of California at Riverside, and the University of California at Davis are among other institutions supporting or proposing to support restoration-related research at Cuyamaca related to this and other projects in the park.

Soil research conducted by Paul R. Kemp and Lisa M. Baird at the University of San Diego began in 2011. This study assesses the contribution of ceanothus to soil fertility and post-fire site recovery in CRSP including portions of the Project Area. Previous research has shown that rates of nitrogen fixation may be impacted by the presence of ceanothus and could be important in replenishing nitrogen lost through volatilization from burning vegetation. The study in the Project Area includes collecting soil samples at various depths across sites with different levels of ceanothus brush density. These samples will be compared to data from nearby ecosystems. The results of the study are expected to help inform the overall approach to restoration of the conifer components of the park over time.

South Entrance Park Sign
(photo: Nancy Budge)

B. Definition of Project Area Boundaries

The Project is located in the 24,768 acre CRSP. The sites selected for reforestation will consist of numerous non-contiguous areas totaling approximately 2,530 acres at the completion of planting. In order to maintain adequate flexibility to ensure maximum success and survivability of the reforested sites and protect other park resources, the submitted provisional Project Area boundaries for initial project verification encompass a total of 5,664 acres (2,292 ha) (See Map CRSP 1: Project Area Boundaries).

The reason 5,664 acres are identified as the Project Area, when approximately 2,530 acres will be planted, is to meet obligations defining the Project Area within the 30 month initial verification window while allowing flexibility to narrow down and finalize the remaining acres to be planted. The final project area – to be verified at the second site visit verification – will be approximately 2,530 acres including the 725 acres (293 ha) that have been planted during the first reporting period and acres that are nominated for potential reforestation for the remainder of project planting activities, and will not exceed or fall outside of the provisionally specified 5,664 acre Project Area, defined in Map CRSP 1.

Planting for the Project is expected to continue over nine more planting seasons, through 2020. The acreage nominated for the Project are areas with little to no natural tree regeneration as determined by the surveys conducted by Dr. Janet Franklin and her students at San Diego State University. In addition to planting areas with little evidence of natural regeneration, acreage is nominated with consideration of the following:

- ✓ Occupation by conifer forest types before the Cedar Fire.
- ✓ Soil/aspect/slope/elevation characteristics.
- ✓ Distance to nearest viable seed source with the goal of planting away and upslope from those sources in order to create additional viable seed sources.
- ✓ Accessibility for effective site preparation work by available contractors.
- ✓ Botanical and cultural survey work.

Bedrock Mortars – CRSP 2004
(photo: www.palomar.edu/archaeology)

The first four years of experience with the Project, 2008 through 2011, have resulted in increased knowledge of site attributes which need to be considered to inform subsequent site selections in the park. These include:

- ✓ Results from survival surveys on reforested sites and feedback for suitable soil/aspect/slope/elevation attributes.
- ✓ Cost and effectiveness of site preparation work by available contractors.
- ✓ Mandated cultural survey work and necessary avoidance implementation complete prior to approval for planting. In some areas mastication (mechanical brush removal) and/or prescribed burning must occur prior to commencing these surveys due to the presence of thick brush. Only after completion of the surveys are sites able to be approved for planting.

- ✓ Considerations of the unique ecology of each nominated planting site including assessments based upon pre and post fire vegetation data, microclimate, habitat characteristics, accessibility, and other factors.

One potential drawback for California State Parks including additional acreage in the Project Area boundaries is the unnecessary monitoring costs associated with acres that will not be planted as part of the Project. California State Parks took this issue to the Climate Action Reserve in February of 2011 and explained that the inventory work and monitoring of these acres not impacted by the Project could potentially add thousands of dollars annually to the 100-plus years of monitoring obligation of the park. The Climate Action Reserve (Garcia and Nickerson, *Conference Call*) agreed that acreage nominated but not reforested in the Project could be labeled "dormant" and would not be included in the calculation of the baseline and would not require ongoing monitoring. At the time of the second site verification, when a full inventory of carbon stocks and quantified model of the baseline is required, the "dormant" areas will be specifically identified and removed from the registered final Project Area.

An additional concern of California State Parks is to consider opportunities for future project submissions. California State Parks would like to avoid including acreage in the final Project Area boundaries that may be desirable for a second or third reforestation project in the park. By including acreage that is currently nominated but not planted, these acres would be ineligible for inclusion in a second or third reforestation project area in the future. (See Section 12 (a) (8) of the Project Implementation Agreement, http://www.climateactionreserve.org/wp-content/uploads/2011/05/PIA_5-9-11_with_Exhibits.pdf). A preferable treatment would be for these acres to become eligible for a subsequent project when removed from the final Project Area at the time of the second site visit verification.

Mike Puzzo, scientist, California State Parks, Checking Project Boundaries
(photo: Nancy Budge)

Given these concerns about the definition of the Project Area boundaries, California State Parks has proposed a revision of FPP 3.2 to both the Climate Action Reserve and the California Air Resources Board to change the language in order to allow a Forest Owner to finalize the geographic boundaries of the Project Area at the second site verification. This would apply to Reforestation Projects that have elected to defer initial inventory until the second site verification (FPP 3.2, Section 6.1.1) (See Exhibit 1: Memorandum to the California Air Resources Board 2/14/2011). The Reserve has accepted that California State Parks will define the final Project Area at the second site visit verification, at which time the final Project Area acreage will be registered, signified by recordation of the Project Implementation Agreement on the specific plots associated with the finalized Project Area.

C. History and Description of Project Location
(***FPP 3.2 Reference: Sections 3.8, 4, Appendix A.1)***

The following is summary information describing the history and features of the Project location. Much of this information is available from the park's 2009 Vegetation Management Plan (See Exhibit 2: Vegetation Management Plan, CRSP):

- General Location, Towns and Roads
  CRSP is located 40 miles (64 km) east of San Diego on California Highway 79 in San Diego County, California. Towns close to the park include Julian, California and Descanso, California. Major nearby roads, in addition to California Highway 79 which goes through the park include U.S. Interstate Highway 8 and California Highway 78 (See Map CRSP 2: General Location).

- Ownership
  CRSP is owned in fee title by the State of California (California State Parks) with 100% management decision making subject to two deed-restricted parcels which are outside of the Project Area boundaries (Acquisition Parcel PHN 72-3621: timber cutting requires permission of U.S. forester; Acquisition Parcel PHN 72-5990: Restrictive Covenants related to CalTrans woodland oak protection program) (See Map CRSP 3: Deed Restricted Parcels). California State Parks has unambiguous and exclusive ownership claim to any GHG reductions and removals achieved by the Project over the verification period.

- FIA Assessment Area
  The Project Area is located within the U.S. Forest Service Forest Inventory and Analysis (FIA) Southern California Mountains supersection and the Southern California Mixed Conifer forest community or assessment area.

- Topography
  CRSP is located in the Cuyamaca Mountains, within the Peninsular Ranges of Southern California. Roughly two-thirds of CRSP is steep rugged terrain and the remainder is fairly level and rolling. There are six named peaks over 5,200 feet (1,586 m), the highest being Cuyamaca Peak. Elevations range from 3,400 feet (1,036 m) to 6,512 feet (1,985 m). The Project is located between 32° 53' N - 33° 0' N latitude and 116° 36' W - 116° 30' W longitude (See Maps CRSP 4-NW, CRSP 4-NE, CRSP 4-SW, CRSP 4-SE: Topography).

- Geography and Soils
  CRSP lies within the Peninsular Ranges Geomorphic Province and is made up primarily of granitic, schist and gneiss rock. Soil types are of a generally highly erodible nature (See Map CRSP 5: Soil Types).

- Conifer Forest Area in the Park
  The total conifer forested areas in the park, prior to the 2003 Cedar Fire, included Mixed Conifer Forest and Pine-Oak Woodland. They encompassed 9,737 acres (3,940 ha) of the 24,768 acres (10,023 ha) in the park. The Project Area is located on portions of the previously forested areas in the park (See Map CRSP 6: Pre-Fire Vegetation Types).

- Conifer Forest Vegetation Types in the Project Area – Before the Cedar Fire

  The coniferous forest components for the 5,664 acre Project Area included 2 vegetation types prior to the Cedar Fire, with native tree species components as follows:

  Mixed Conifer Forest is generally found above the 5,400 ft (1,646 m) elevation on major peaks in the western portion of CRSP. The dominant species are white fir, incense cedar, Jeffrey pine and sugar pine. This forest type was found on 1,776 acres (719 ha) before the Cedar Fire representing 31% of the Project Area.

  Pine-Oak Woodland is generally found below the 5,400 ft (1,646 m) elevation, depending on slope and aspect, and is scattered throughout CRSP below the higher peaks where it intergrades with Chaparral and other vegetation types. The dominant species are Jeffrey pine, coast live oak, canyon live oak, California black oak and, to a lesser degree, Coulter pine. This forest type was found on 3,888 acres (1,574 ha) before the Cedar Fire representing 69% of the Project Area.

- Vegetation Types in the Project Area – After the Cedar Fire

  The vegetation types, after the Cedar Fire in the 5,664 acre Project Area, include Exposed Annual Type Conversion, Monotypic Shrub Type Conversion, and Post Fire Oak Re-Sprout. These vegetation types are defined for the post-fire CRSP landscape, with percent cover estimated from post-fire aerial photos, as follows:

  Exposed Annual Type Conversion is found in areas with little or no tree canopy regeneration or recovery and where no natural viable chaparral seed bank existed prior to the Cedar Fire. Although this vegetation type is not generally confined by elevation, it rarely occurs above 6,000 feet. It is dominated by non-native grass species, such as Bromes, with some native annual species interspersed. This vegetation type covers approximately 34% of the Project Area (1,930 acres/781 ha).

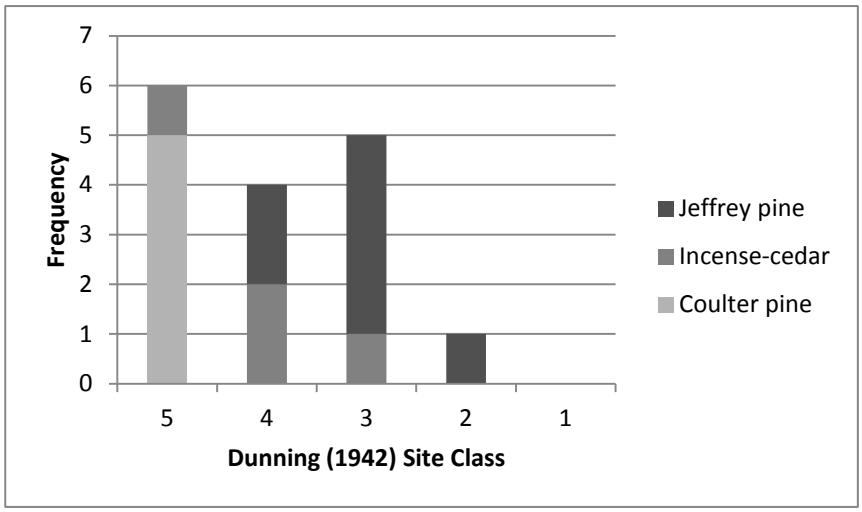
  Monotypic Shrub Type Conversion is found in areas where conifer canopy has been nearly eliminated by the Cedar Fire and oak canopy is either not regenerating well or did not exist prior to the fire. It is not confined by elevation. It is almost completely dominated by *Ceanothus palmeri* with sporadic annual species below and other native chaparral species interspersed. This vegetation type covers approximately 60% of the Project Area (3,400 acres/1,376 ha).

  Post Fire Oak Re-Sprout occurs in areas where nearly all conifer canopy was eliminated by the Cedar Fire and mixed oak species interspersed have regenerated well enough to create a new canopy type. The dominant species are Black Oak at the higher elevations and Coastal Live Oak at lower elevations and riparian areas. This vegetation type covers approximately 6% of the Project Area (340 acres/138 ha).

- Site Classes

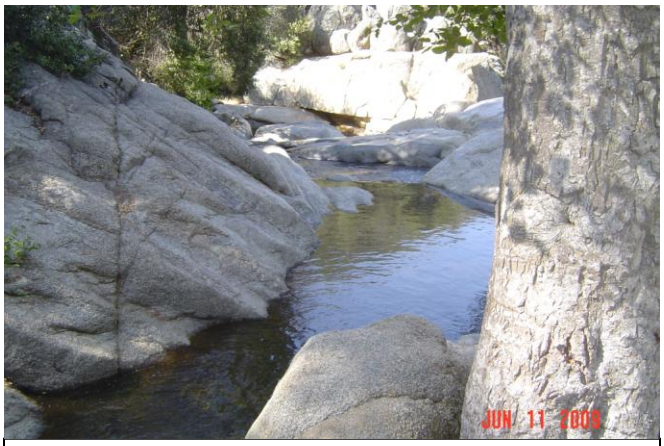
  Site classes are productivity classes defined by ranges of site index. Site index is measured as the height of a tree at a given age (age 50 years or 100 years are the typical standard base ages used in California). The site classes most appropriate for the Project are the Dunning (1942) site classes; as referenced in the California Forest Practice Rules (14 CCR §1060).

  A sampling effort was conducted in November 2007 to generate site index values that would provide the basis for modeling reforestation and growth. Sample points were established within a cross-sectional area that represents the dominant aspect and elevation in which conifers were once found. Sampling included tree height, species, diameter and age. The results by species are shown below for the 16 trees sampled. The average site class was 3.9 with a range from 2 to 5 with the preponderance in site classes 3 to 5.



- Watercourses in Area

  CRSP is located within three watersheds as defined by the National Hydrologic Dataset. The most prominent is Upper Sweetwater River, a perennial creek that flows southwest through the heart of CRSP. The other two are Upper San Diego River in the northern portions of the park and Pine Valley Creek in the southeastern portion of the park. Lake Cuyamaca, which drains into the San Diego River, is adjacent to CRSP and forms 3.6 miles (5.8 km) of the northern CRSP boundary. The Project Area includes sites located in all of the watersheds (See Map CRSP 7: Watercourses/ Watersheds).



Sweetwater River at Green Valley Falls
(photo: Nancy Budge)

- Existing Land Cover and Land Use

  CRSP is a predominantly wildlands park with a variety of land uses including state wilderness, wildlands, cultural and natural preserves and a range of recreation facilities. The surroundings are a mixture of public wildlands and private lands with a varying density of homes and other human development. Currently the 24,768 acre park consists of 13,200 acres (5,341 ha) of designated wilderness, 2,500 acres (1,012 ha) of cultural preserve, and the balance in scenic open space and developed acreage. The developed areas of the park include over 160 campsites, hiking, biking, and equestrian trails, shop and storage buildings, sector office, visitor center, park store, an equestrian camp, the San Diego Outdoor School Camp, nine permanent and one seasonal residence and one historic house on property not yet open to the public (See Exhibit 3: CRSP Pamphlet and Recreation Map). The park averaged 440,000 total annual visitors in 2009 and 2010 (See Map CRSP 8: Park Facilities).

- Historical Land Use

  The land within the boundaries of CRSP was occupied by the Kumeyaay Indians in prehistoric times. The Kumeyaay traditionally were hunter-gatherers who followed a seasonal subsistence pattern managing the land for both plant and animal production. The Native American traditional use ended by the early 1850s and cattle grazing occurred annually from around the 1840s until the 1950s. This took place primarily in the Montane Meadow/ Grassland vegetation type of CRSP.

Stonewall Mine 1915
(photo: Courtesy California State Parks Photographic Archives)

Stonewall Mine
(photo: http://miningartifacts.homestead.com/California-Mines)

  The Stonewall Mine, established in 1870, included a small community of 500 residents. Much of what is now the park was owned by Robert Waterman, the Governor of California from 1887 to 1891. During this period, large quantities of timber were cut for construction and to fuel the ore crushing operation. The rancho property changed hands several times until 1933 when Mr. and Mrs. Ralph M. Dyar sold it to the state for half of its appraised value to create CRSP. During the 1930s CRSP's campgrounds, fire roads, erosion prevention, picnic areas and residences were built with the assistance of the Civilian Conservation Corps. Historical evidence indicates that low intensity natural/Native American fires were common in the 1800s. Since the 1950s, fire suppression

management in the park and removal of cattle caused changes in the natural age class structure, and alteration of the extent and distribution of many species. Fuel accumulated in the absence of periodic fires in the form of invasion by Chaparral, increase in woody shrubs, dense thickets of trees and accretion of woody debris.

- Climate Zone Classification

  The climate of the park is Mediterranean consisting of warm, dry summers and cool, wet winters. Most precipitation (87%) occurs between November and April with periodic rain in late summer (See Map CRSP 9: Annual Rainfall). The 106-year average annual precipitation measured at Lake Cuyamaca Dam with an elevation of 4,640 feet (1,414 m) is 37.5 inches (95.27 cm). Precipitation is likely to be considerably higher on peaks up to 2,000 feet (610 m) above the lake. Temperatures range from near 100° F in summer to well below freezing in winter. The park and Project Area cover a wide range of elevations and aspects, which strongly influence the microclimate and vegetation types in this moisture constrained ecosystem.

- Land Pressures

  The Project is within a designated California State Park. While there is some recreational development in the area, it does not currently constitute a development or significant impact threat within the park. Over half of the park's acreage is designated as state wilderness. With the land in state park status, there is little pressure for any type of further conversion. There are no plans for additional utility lines or major roads through the park. The biggest threat to any vegetation management at the park is wildfire. Prevailing winds are from the west, but high velocity Santa Ana offshore winds from the northeast generate serious fire conditions in fall, winter and early spring. Danger from wildfire is highest in the dry, windy conditions of September through November.

Post-Fire View South off Stonewall Peak Trail – November 2007
(photo: Nancy Budge)

D. Eligibility Requirements and Project Type
(FPP 3.2 Reference: Sections 2.1.1, 3.1.1.1, 3.1.2.1)

The Project is a Reforestation Project eligible for registration at the Climate Action Reserve because it occurs on land that has undergone a significant fire disturbance. The Project does not take place on land that was part of a previously registered Forest Project. The Project is located on a type of land that the Forest Owner has not historically allowed nor has any plans to allow commercial timber harvesting and therefore does not need to meet an eligibility scenario from Appendix E of the FPP (See Exhibit 4: No Commercial Timber Harvest Declaration Letter). The Project's reforestation activities are not legally required and were not legally required at the time of the Project's start date. (See Exhibit 9: Richard G. Rayburn's 3-25-2009 Letter and discussion in Section J, "Scope of Management Activities without the Project") California State Parks has uploaded a signed Attestation of Voluntary Implementation for the Project to the Reserve's Web Site.

<u>2003 Cedar Fire</u>

Between October 25 and November of 2003, the Cedar Fire burned over 270,600 acres (109,500 ha) in Southern California including almost the entire CRSP (See Map CRSP 10: Cedar Fire Perimeter and Map CRSP 11: Cedar Fire Perimeter Showing CRSP). This was the largest fire in California as recorded by fire perimeter maps which have been used to document the extent of burned areas since the early 1900's.

2003 Cedar Fire Westside of CRSP
(photo: Scott Martin, CA State Parks)

The Cedar Fire began in the Cleveland National Forest on October 25, 2003 south of Ramona in central San Diego County. The fire was fast-moving due to strong easterly (Santa Ana) winds. The fire pushed southwest then east destroying 2,232 homes burning acreage in Wildcat Canyon, Eucalyptus Hills, the Barona Indian Reservation, the Scripps Ranch community, Alpine, Harbison Canyon, Crest, the entire community of Cuyamaca, Cuyamaca

Rancho State Park, Julian, and Santa Ysabel. Firefighters achieved full containment on November 3 and complete control on December 5. One firefighter died and over 104 firefighters sustained injuries. There were 13 civilian casualties. The fire forced the evacuation of the main air traffic control facility for San Diego and Los Angeles, shutting down all commercial and general aviation in the area and disrupting air traffic across the United States.

Removal of Live Biomass in Trees

Conifer mortality in the park was extremely high due to the fire severity and high temperatures which resulted in very low seed cone survival (See Map CRSP 12: Aerial Photo Before Cedar Fire, Map CRSP 13: Aerial Photo After Cedar Fire, and Map CRSP 14: Burn Severity in Project Area). In 2007, Brett R. Goforth and Richard A. Minnich published a paper on the factors contributing to the stand replacement nature of the 2003 Cedar Fire and reported: "Over 95% of the entire MCF [*mixed conifer forest*] landscape at the CRSP was fire-killed." (Goforth and Minnich, 2007)

After the Cedar Fire, a study was initiated by Dr. Janet Franklin of San Diego State University to look at post-fire vegetation dynamics. The results to date from these surveys which were conducted in 2004, 2005, 2007, and 2008 (Franklin et al., 2006, Franklin, 2008, Bergman, 2009, Franklin and Bergman, 2011) indicate:

- Oak species experienced <14% mortality. Many more trees were "top-killed" but had re-sprouting by the second year.
- Shrub cover (particularly ceanothus) increased significantly.
- Exotic herbaceous annuals, particularly brome grasses and mustard, increased significantly.
- Conifer species experienced >95% mortality across the entire park. Although analyses on conifer regeneration are ongoing, overall natural regeneration has been generally sparse and predominantly Coulter pine. Surveys in 2008 show some regeneration on about one third of the plots. In addition, some small patches of incense cedar and sugar pine have been found where the fire was less intense.
- In general, a negative correlation was found between regeneration and competing shrubs although in some cases shrubs can aid seedling survival. In addition to the potential benefit of increased soil nitrogen, shrubs have been observed to provide shade to seedlings.

Cuyamaca Rancho State Park after the Cedar Fire
(photo: http://interwork.sdsu.edu/fire/photo_gallery/CuyamacaRanchoStatePark.htm)

E. Regulatory Compliance
(FPP 3.2 Reference: Sections 3.8, 3.9)

The Project is in compliance with all applicable laws relevant to the Project activities. California State Parks has uploaded a signed Attestation of Regulatory Compliance for the Project to the Reserve's Web Site. The following describes the local, state and federal regulations applicable to the Project activities as well as the mitigation/protection measures associated with the Project activities.

Applicable Local, State, and Federal Regulations

California State Parks, as the California government agency that has the principal responsibility for carrying out and approving the Project is the Lead Agency under the California Environmental Quality Act (CEQA), and is responsible for preparing CEQA documents. In conjunction with CEQA reviews, California State Parks conducts applicable reviews for potential impacts to cultural and historical resources under California Public Resources Code (PRC §5024.5), which requires state parks to inventory, preserve and maintain historical resources on state park property.

California State Parks has prepared three CEQA documents in conjunction with the reforestation activities:

1. Review was conducted and activities were determined to be categorically exempt (with no significant impacts to the environment) for the first phase of the activities: Mixed Conifer Forest Restoration/Experimental Planting – Phase I. A Notice of Exemption was filed on February 2, 2009, with the State Clearinghouse (SCH# 2009028080).
2. Review was conducted for the next phase of project activities: Mixed Conifer Forest Restoration/Experimental Planting – Phase II and a Notice of Exemption was filed June 2, 2009 (SCH# 2009068023).
3. A Vegetation Management Plan for CRSP was subsequently developed, with the CRSP Reforestation Project included in the scope (See Exhibit 2: Vegetation Management Plan, CRSP). This Vegetation Management Plan underwent review under CEQA and a Notice of Exemption was filed August 3, 2009 (SCH# 2009088012).

Copies of the filed Notices of Exemption and project reviews for all three of the above are attached as Exhibit 5: Notices of Exemption and Project Review Documents.

The complete list of regulations providing authority to the Colorado Desert District of California State Parks to engage in Project activities as a part of the park's Vegetation Management Plan are listed below (also listed in the Vegetation Management Plan):

- California Public Resources Code
    - PRC §4291 – Covers the state's responsibility for fire protection around structures.
    - PRC §5001.65 – Commercial exploitation of resources is prohibited.
    - PRC §5002.2 – Declaration of Purpose (long-range management objectives consistent with park classification). Declaration of Resource Management Policy.
    - PRC §5003 – Authorizes the Department to manage the lands under its jurisdiction.
    - PRC §5019.50 – Operational restrictions dependent upon park classification.
    - PRC §5019.53 – The purpose of California State Parks is to preserve outstanding natural and cultural values.

  - PRC §5024.5 – Requires DPR to inventory, preserve and maintain historical resources on state park property.
  - PRC §5093.36 – Gives a state agency jurisdiction over a wilderness area to address environmental damage or degradation with use of minimum management and tools.
  - PRC §5097.9 – Prohibits public agencies from damaging Native American sacred sites or cemeteries.
- California State Park and Recreation Commission
  - Cuyamaca Rancho State Park General Plan, 1986. The plan includes appropriate Natural and Cultural Resource Management Goals and Guidelines, State Wilderness, Natural and Cultural Preserves designations.
- California Department of Parks and Regulation (DPR) Operation Manual (DOM) Policy
  - Plant Resources – DOM §310
  - Tree Hazard Program – DOM §1104
  - Pest Control Policy – DOM Chapter 0700
  - Prescribed Fire Management Policy
- Other Related Laws and Regulations
  - U.S. Endangered Species Act
  - California Endangered Species Act
  - California Environmental Quality Act (CEQA)
  - California Code of Regulations Title 14, §4351.1, guidelines to reconcile the preservation of wilderness values with the use of state wildernesses by the public.
  - Forest Practices Act: The Department is exempt from preparing Timber Harvest Plans {PRC §4584(f)}. However, the Department is not exempt from Professional Foresters Law {PRC §750-783}.
- Permits
  - Burn Permits: issued by the responsible fire suppression agency.
  - Smoke Management Permit: issued by the local Air Quality Management District or Air Pollution Control District.
- California Department of Fish and Game Streambed Alteration Agreement [California Fish and Game Code, Sections 1600-1616].

<u>Mitigation/Protection Measures Implemented on the Ground</u>

The avoidance and protection measures generated by cultural reviews under Public Resources Code 5024 (cultural resources) and CEQA include:

- Roads and Trails: Work supervisors and crews should follow the restrictions laid forth in the Sector Superintendent's recently issued Backcountry Road Driving Policy to protect the dirt roads and trails from adverse damage. However, because this limits protection to the road surfaces, the Sector/District should produce a Constraints Use Map to guide work along recorded CCC-era and/or other potentially historic trails. In addition, pre-work archaeological surveys and monitoring should help identify historic archaeological features associated with the roads and trails, which should then be flagged in some manner to identify them to the work crews. The supervisors, work crews, as well the operators of the tracked masticator, trucks, and other vehicles should avoid driving, operating, or parking these vehicles on any stone rubble masonry features (culverts, retaining walls, curbing, etc.) associated with the roads or trails to minimize damage to these and other potentially historic features. These treatments along the existing road

and trail rights-of-way should reduce any adverse effects to any known or potential historic resources to a less than significant level of impact.

- Equipment Exclusion Zones: The Project includes provision for flagging five cultural resources as Equipment Exclusion Zones where no ground disturbing activities will be allowed to take place.
- Archaeological Monitoring: Archaeological monitoring during mastication must be carried out. In the event that previously undocumented cultural resources are encountered during project construction (including but not limited to dark soil containing shellfish, bone, flaked stone, groundstone, or deposits of historic trash), work within the immediate vicinity of the find will be temporarily halted or diverted until a DPR-qualified cultural resource specialist has evaluated the find and implemented appropriate treatment and disposition of the artifact(s).
- State Forest Practices: State forest practices must be followed to avoid acts of track machines on skid trails, access roads, etc. Rehabilitation of disturbed areas is the responsibility of the contractor.

Food Preparation Grinding Basins Used by the Kumeyaay in Boulders Surrounding a Large Opuntia Cactus Garden – CRSP Pre-Cedar Fire
(photo: Melvin Sweet, Colorado Desert Archaeological Society volunteer, 2002)

Additional avoidance and protective measures from the park's Vegetation Management Plan include:

- Protection of Cultural Resources: With sufficient pre-project review, archival and field research, and implementation of appropriate protection measures, vegetation management activities can proceed with no significant impacts on cultural resources. To ensure that no significant impacts occur to CRSP cultural resources the following measures should be implemented:

1. Accurately map the Project Area for all projects that potentially may involve ground-disturbing activities. Provide copies of the map to the Colorado Desert District's Associate State Archaeologist who will complete a records review to determine if the area has been surveyed previously for the presence of cultural resources. If the area has not been surveyed, or if survey conditions have substantially changed, the District archaeologist will complete a cultural resource survey of the area, including the preparation of a DPR 523 Archaeological Resource Record Form for any cultural resources discovered. A memo report, documenting the methods and results of the survey, shall be prepared by the archaeologist and a copy provided to the project manager.
2. The archaeologist shall work with the project manager to identify areas of potentially significant cultural resources and shall recommend strategies for avoidance of impacts to cultural resources during vegetation management activities. Strategies would include flagging of sensitive areas and directed archaeological monitoring.
3. The project manager, with assistance from the District archaeologist, shall ensure that flagging and provision for archaeological monitoring is implemented and that field supervisors and field crews have necessary maps and on-the-ground knowledge of sensitive cultural resource areas to be avoided. At the end of each season, a brief letter report, including DPR523 resource records for newly discovered sites, will be prepared by the archaeological monitor.

- Protections for Developed Recreation Areas:
  1. Avoid unsafe plant species. Only safe species will be retained and no planting of certain undesirable species which may cause hazards (e.g. avoid exotic species, Coulter pines because of their abundant, heavy cones, and, overly flammable types such as dense stands of incense cedar).
  2. Reduce fire hazard. As set forth in Public Resources Code (PRC) 4291, measures will be implemented to protect people and structures in the developed zone. This consists mainly of prescriptive vegetation removal.
  3. Reduce tree hazard. All trees in the developed areas will be inspected biennially for hazardous conditions and mitigated according to Department Tree Hazard Policy.

Middle Peak Planting Area - 2011
(photo: Nancy Budge)

F. Project Activities and Start Date
(FPP 3.2 Reference: Section 3.2)

Project activities started in fall of 2007 with planning, GIS mapping and site preparation by California State Parks and California Department of Forestry and Fire Protection (CAL FIRE) employees for two pilot planting areas totaling 29 acres. CAL FIRE crews began site preparation work for the Project's pilot area along Lookout Fire Road on October 1, 2007. (See Exhibit 6: CAL FIRE FC 33 Showing Start of Project Activities) This site preparation work represents the activity which initiated reforestation in the Project Area and therefore identifies the Project Start Date as October 1, 2007.

During the summer of 2008, inventory of pre-treatment live and dead trees and brush was collected for plots in anticipation of the next year's planting. Site preparation work was performed throughout 2008 and involved CAL FIRE hand crews with chain saws. Approximately 56 acres required light to heavy brush removal.

In February and March 2009, CAL FIRE crews planted 48,524 seedlings on 177 acres including supplemental planting in the pilot sites from the previous year. During the summer of 2009, acreage for the third year of planting was mapped and site preparation work began in late August. Approximately 69 acres were prepped for planting using mechanical brush removal (a double track with a brush mastication head) with the balance of 52 acres that required site preparation completed by hand crews.

In February of 2010, contract crews planted 74,835 seedlings on 278 acres, and in February of 2011, contract crews planted 92,730 seedlings on 486 acres. Both years included supplemental planting on acres planted the previous year to meet long-term restoration goals for tree density. The footprint of the Project area, not including areas replanted, totals 725 acres through the 2011 planting season (See Map CRSP 15: Planting Footprint by Year 2008-2011).

The Project has not employed broadcast fertilization during the Project's first three years of operation and there will be no use of broadcast fertilization at any future time in the Project (See Exhibit 7: Declaration That Project Does Not Use Broadcast Fertilization).

Planting by Inmate Crews February 2009
(photo: David Janssen, CAL FIRE)

Follow-up survivability monitoring is ongoing by park staff, CAL FIRE foresters, and researchers from University of San Diego. Survival of planted seedlings has been variable dependent on specific site attributes such as moisture conditions and competition from grasses. Expectations are for seedlings in the Project to exceed survivability and succession rates normally projected for natural regeneration in the mixed conifer/pine-oak woodland vegetation types for this region.

Below is a table showing the activities for the Project which have been completed to date and budgeted for 2012.

Cuyamaca Rancho State Park Reforestation Project - Activities

Fiscal Year (July 1-June 30)	2007/2008	2008/2009	2009/2010	2010/2011	Total		Budget 2011/2012
Site Prep - Hand Crews	42	56	52		150		
Site Prep - Mechanical			69	40	109		151
Site Prep Acres Total	**42**	**56**	**121**	**40**	**259**		**151**
New Acres Planted	28.6	148.4	188.7	358.8	725		272
Seedlings Per Acre	*280*	*300*	*310*	*240*	*272*		*230*
Acres Interplanted	0	28.6	89.1	127.2	245		75
Seedlings Per Acre		*140*	*183*	*52*	*110*		*130*
Planting Acres Total	**29**	**177**	**278**	**486**	**969**		**347**
Jeffrey Pine	8,000	38,819	64,275	66,470	177,564	79%	48,448
Coulter Pine		6,308	1,875	20,170	28,353	13%	13,739
Incense Cedar		3,397	6,025		9,422	4%	
White Fir					0	0%	5,062
Sugar Pine			2,660	6,090	8,750	4%	5,062
Total Seedlings	**8,000**	**48,524**	**74,835**	**92,730**	**224,089**		**72,310**
Source of seedlings	All Magalia	All Magalia	56,960 from Magalia; 17,875 from Placerville	5,520 from Magalia (SP); 87,210 from Placerville			All Placerville
Zone	998	998	997/998	998			997/998
Plug or Bare Root	Bare Root	Bare Root	Bare Root from Magalia, Plugs from Placerville	Bare Root from Magalia, Plugs from Placerville			100% Plugs
Age		IC - 1-1, 1-0 JP - 2-0 CP - 1-0	IC - 1-1, 2-0 JP - 2-0 CP - 1-0	SP - 2-0, 1-0 JP - 1-0 CP - 1-0			All 1-0's
Planting Done By	Cal Fire	Cal Fire	Contractor	Contractor			Contractor
Site Preparation - Location of Activities	Fall '07 - Cuyamaca Peak Rd, hand grubbing roots of ceanothus, Spring '08 - Azalea Spgs Rd, Middle Pk Rd	Cuyamaca Peak Road, Middle Peak Road	Mechanical Site Prep on Middle Peak; hand grubbing Azalea Springs	Along Highway 79 across from Paso Picacho			Middle Peak, NW Stonewall Peak Area
New Acres - Location of Activities	Pilot Plots on Cuyamaca Peak Road, Middle Peak Fire Road	Azalea Springs Road to Milk Ranch Road, Middle Peak, West Mesa	Along Highway 79, near Sweetwater Bridge, Middle Peak, West Mesa, Stonewall, Azalea	East Mesa, Horse Camp, Green Valley, Middle Peak			Middle Peak, NW Stonewall Peak Area
Interplanting - Location of Activities	none	Pilot Plot on Cuyamaca Peak Road	West Mesa, Azalea Road, Middle Peak	Middle Peak, West Mesa, Azalea			West Mesa
Sources of Information	1. Cal Fire FC-33 Documents						
	2. 2009/2010 CRSP Reforestation Project Annual Report						
	3. Report from Planting Contractor: California Reforestation Inc (CRI), 2010 and 2011						
	4. Gary Reese email 1-15-2011						
	5. 2009 emails Pete Scully & Nathan Malcomb (Cal Fire)						
	6. Project Meeting Updates and Notes by Lisa Gonzales-Kramer March-June 2011						
					Last Updated:	*9/28/2011*	

G. Ongoing Project Activities
(FPP 3.2 Reference: Section 3.8, 9.1.1)

During 2012-2020, there will be up to nine additional phases of planting as shown in the chart below. This schedule may be accelerated or delayed depending on funding and other factors such as weather. Sites selected for reforestation will total 2,530 acres at the completion of planting. After planting, return treatments are expected to include a 4-8 year return to the planting sites for brush and grass removal, and a 10-15 return for thinning. Future project work will also include ongoing monitoring of carbon stock inventories. There are no expectations for any current or future commercial harvesting of live standing trees in the Project Area (See Exhibit 4: No Commercial Harvest Declaration Letter).

Reforestation Project

Cuyamaca Rancho State Park
Reforestation Phases

	Acres Planted (not including interplanting)		Planting Complete By:
	Annual	Cumulative	
Pilot	29	29	March 2008
Phase 1	148	177	March 2009
Phase 2	189	366	March 2010
Phase 3	359	725	March 2011
Phase 4	272	997	March 2012
Phase 5	203	1,200	March 2013
Phase 6	200	1,400	March 2014
Phase 7	200	1,600	March 2015
Phase 8	200	1,800	March 2016
Phase 9	200	2,000	March 2017
Phase 10	200	2,200	March 2018
Phase 11	200	2,400	March 2019
Phase 12	130	2,530	March 2020

Site Preparation

Of the areas remaining to plant, approximately two thirds or 1,200 acres will require site preparation work. The park will employ a variety of site preparation methods due to variations in slope, soil conditions, CAL FIRE crew availability, and contractor availability. On the acres requiring site preparation, the majority of the brush consists of ceanothus averaging 4’ in height which will be cut, piled, and burned.

Planting

Seedlings will be sourced from the CAL FIRE nurseries, the USFS nursery in Placerville, and other sources as available. In 2010, seed cones were collected in the park and sent to CAL FIRE's L.A. Moran Reforestation Center in Davis, CA, for germination and use in the Project. The overall target species mix is 65% Jeffrey pine (*Pinus jeffreyi*), 15% Coulter pine (*Pinus coulteri*), 8% sugar pine (*Pinus lambertiana*), 5% incense cedar (*Calocedrus decurrens*), and 7% white fir (*Abies concolor*). Higher percentage of Jeffrey pine has been chosen because this species is more fire resistant, disease resistant, and has not been regenerating well on its own. Seedlings may be protected from deer browse with Vexar tubing, and from excessive heat with shade cards and mats to reduce mortality. The Project will include a total of approximately 1,000,000 planted seedlings.

Future Vegetation Treatments

After planting, the sites will be monitored for browse damage and survivability. Planting crews will follow-up with supplemental planting as needed. In addition, within the first 4-8 years after planting, crews will revisit the Project site and remove any brush or grass to enhance growth and minimize vegetation competing for moisture and sunlight. Within 10 to 15 years of planting, crews will revisit the site for thinning and fuel treatment work. Another thinning operation may be required within 30 years of planting to ensure that stand densities are at an approximate level of 100 square feet of basal area across of a range of diameter classes. During this time period, other fuel reduction treatments such as prescribed fires may occur on specific targeted acres. This is a long-term and essential element of the park's adopted Vegetation Management Plan.

Approval of Project Activities

The Project activities have been explicitly approved by Stephen Bakken, Forester II, California Department of Parks and Recreation, Gail Sevrens, Acting District Superintendent, Colorado Desert District, California Department of Parks and Recreation, and Jim Dice, Senior Environmental Scientist, Colorado Desert District, California Department of Parks and Recreation (See Exhibit 8: Explicit Approval of Baseline and Project Activities).

CAL FIRE Review of Planting Sites 2009
(photo: Nancy Budge)

H. Secondary Effects

(*FPP 3.2 References: Sections 5.1 and 6.1.5)*

Secondary effects, or unintended GHG emissions, caused by the Project will come from combustion emissions associated with machinery use in site preparation work. The reforestation activities are not displacing any existing cropland or grazing activities so leakage risks associated with the shifting of these activities is zero.

Biological emissions from removal of shrubs and herbaceous understory during site preparation will be captured by measuring changes in included carbon reservoirs with the monitoring of carbon pools impacted by site preparation. No biological emissions from the decomposition of forest products are anticipated as a result of the Project activities.

Mastication Contract Work 2009
(photo: David Janssen, CAL FIRE)

Combustion emissions associated with the machinery use in site preparation are calculated using the standard emission factors from the FPP 3.2. (FPP 3.2, Table 6.1, p. 43) Due to the ongoing nature of the planting and site preparation work in the Project, these calculations are estimated as follows:

CRSP Reforestation Project - Site Preparation Work				
Secondary Effects Calculations				
Emissions Associated with Mobile Combustion				
Calculation of Secondary Effects - Actual Site Prep Acres Through June 2011				
Brush Cover Density	**% Area**	**Acres with Mechanical Site Prep**	**Average Tonnes CO_2e Per Acre** (from Table 6.1 in FPP v 3.2)	**Tonnes CO_2e**
Light (25% brush cover)	**7%**	**8**	**0.090**	**1**
Medium (25%-50% brush cover)	**43%**	**49**	**0.202**	**10**
Heavy (>50% brush cover)	**50%**	**56**	**0.429**	**24**
Total	**100%**	**113**		**35**
Calculation of Secondary Effects - Estimated For Mechanical Site Prep Acres in Project Area After Planting is Completed				
Brush Cover Density	**% Area**	**Acres with Mechanical Site Prep**	**Average Tonnes CO_2e Per Acre** (from Table 6.1 in FPP v 3.2)	**Tonnes CO_2e**
Light (25% brush cover)	**15%**	**250**	**0.090**	**23**
Medium (25%-50% brush cover)	**14%**	**240**	**0.202**	**48**
Heavy (>50% brush cover)	**71%**	**1210**	**0.429**	**519**
Total*	**100%**	**1700**		**590**
* The total acres shown in this row are the total acres in the Project Area expected for mechanical site preparation.				
An additional 830 acres are expected to be planted w/o mechanical site preparation to reach the Project total of 2530 acres planted.				

I. Use of Native Species and Natural Forest Management
(*FPP 3.2 Reference: Section 3.10.2)*

The Project is designed to return the area to conditions of a diverse native forest favorable for wildlife habitat and resistant to catastrophic fire events as well as create long-term climate benefits. Project activities will improve natural ecosystem processes, enhance native tree species and adhere to the Natural Forest Management practices required by FPP 3.2.

Composition of Native Species

Clues about historical native species composition can be gathered from data collected for the Vegetation Type Map (VTM) survey of California (Wieslander, 1935 as cited in Goforth and Minnich, 2008). Three VTM plots were located in the CRSP for mixed conifer forest (See Map CRSP 16: Wieslander Plot Locations and Krofta Study Area). The stem count of trees over 3.9" dbh within each plot resulted in an overall species mix percentage as follows:

Historical Forest Composition - Cuyamaca Rancho State Park				
Data from Wieslander Vegetation Type Map (VTM)				
Stems > 10 cm (3.9 ") DBH				
		1932 VTM Plots & Elevation		
		Plot 191A52	Plot 191A53	Plot 191A55
All Species Collected		4900 ft.	5200 ft.	5700 ft.
Species	Common Name			
Calocedrus decurrens	Incense Cedar	37%	41%	5%
Quercus kelloggii	CA Black Oak	9%	14%	22%
Abies concolor	White Fir	27%	4%	31%
Quercus chrysolepis	Canyon Live Oak	9%	35%	2%
Pinus ponderosa	Ponderosa Pine	18%	2%	0%
Pinus lambertiana	Sugar Pine	0%	4%	40%
Conifer Species Only				
Species	Common Name			
Calocedrus decurrens	Incense Cedar	45%	80%	7%
Abies concolor	White Fir	33%	8%	41%
Pinus ponderosa	Ponderosa Pine	22%	4%	0%
Pinus lambertiana	Sugar Pine	0%	8%	53%

The Wieslander data generalized all yellow pines to Ponderosa due to the difficulty of distinguishing species in the field. Review of the Wieslander species composition also needs to consider that the data was collected at higher elevations (4,900', 5,200', and 5,700') where greater percentages of white fir and incense cedar would be expected than appropriate for the Project Area which includes elevations below 4,000' (1,219 m).

In 1995, a master's student at San Diego State University, Doug Krofta, completed a thesis which quantified the vegetative structure and composition of a forested area in the park. His study area overlaps some of the Project Area in West Mesa and therefore is generally representative of the pre-Cedar Fire species mix and stand composition in this area (See Map

CRSP 16: Wieslander Plot Locations and Krofta Study Area). The following table shows the results of this thesis work.

Canopy Species - Krofta Study 1995					
Number of Stems					
40 sampled stands - 1995					
1141.3 Ha (2820acres) northern portion of West Mesa					
Species	Common Name	Number Live Stems	% Total stems	Number Live Stems > 40 cm (15.75") dbh	% > 40 cm (15.75") dbh
Quercus chrysolepis	Canyon Live Oak	694	32%	15	7%
Quercus agrifolia	Coast Live Oak	420	19%	26	11%
Pinus coulteri	Coulter Pine	379	17%	58	25%
Pinus jeffreyi	Jeffrey Pine	221	10%	22	9%
Calocedrus decurrens	Incense Cedar	212	10%	25	11%
Quercus kelloggii	CA. Black Oak	199	9%	85	36%
Abies concolor	White Fir	40	2%	2	1%
Pinus lambertiana	Sugar Pine	14	1%	1	0%
Pinus ponderosa	Ponderosa Pine	2	0%	0	0%
		2181	100%	234	100%
(Krofta, 1995)					

Conifer Species Only					
Species	Common Name	Number Live Stems	% Total stems	Number Live Stems > 40 cm (15.75") dbh	% > 40 cm (15.75") dbh
Pinus coulteri	Coulter Pine	379	44%	58	54%
Pinus jeffreyi	Jeffrey Pine	221	25%	22	20%
Calocedrus decurrens	Incense Cedar	212	24%	25	23%
Abies concolor	White Fir	40	5%	2	2%
Pinus lambertiana	Sugar Pine	14	2%	1	1%
Pinus ponderosa	Ponderosa Pine	2	0%	0	0%
		868	100%	108	100%

Part of Krofta's study area (West Mesa) was burned nine years prior to his inventory work in the 1986 Peak Fire. Krofta identifies Coulter pine as an early seral species in post fire succession which accounts for its large percentage in his work.

The review of these past species surveys at the park, after taking into account the nomenclature discrepancies, elevation distinctions, and other issues, has helped inform the appropriate species composition for the reforestation program. Another important factor is the goal to establish a more fire resistant forest. Large, long-lived pines, such as Jeffrey and sugar pines tend to be fire resisters, meaning they have traits, such as thick, fire-resistant bark and self-pruning lower limbs, which allow them to survive low and moderate intensity fires. Forests

dominated by these species can tolerate low to moderate intensity fires on a 10-30 year frequency with very little structural change. When fire becomes less frequent in these forests, shade tolerant species such as incense cedar and white fir can become established in the shaded forest understory. These will act as a fire ladder to carry an eventual fire into the forest canopy, which is what happened during the Cedar Fire. It is desirable to keep them in the species mix at the park but restrict them to higher elevation north and east facing slopes.

Gary Reese, Fire Management Specialist, California State Parks, Inspecting 2010 Planting at Middle Peak
(photo: Nancy Budge)

The Project uses 100% native species. Overall target reforestation distribution mix of species is 65% Jeffrey pine (*Pinus jeffreyi*), 15% Coulter pine (*Pinus coulteri*), 8% sugar pine (*Pinus lambertiana*), 5% incense cedar (*Calocedrus decurrens*), and 7% white fir. To date planting activities (see table on page 24) have been heavy to Jeffrey pine (79%). This percentage is expected to decrease in future plantings and result in an average 65% overall for the Project. Specific sites will be planted with appropriate species mix and densities depending on elevation. Seedlings will come from local seed sources (Zones 997 & 998) including from cone bearing trees within the park. Planting will incorporate a random pattern with spacing designed to recreate historical healthy stand conditions over time.

Combined with the re-sprouting oak and natural regeneration heavier to Coulter pine, white fir, and incense cedar, the overall goal is to return the area to conditions of a diverse native forest favorable for wildlife habitat and resistant to catastrophic fire events. No single species' prevalence in the Project Area is expected to exceed 70% which is the maximum value allowed under the requirements for Natural Forest Management in the FPP 3.2 for the Southern California Mountains supersection and the Southern California Mixed Conifer forest community or assessment area.

Fire resistance is also a consideration in looking at the stocking densities desirable over time for the restored forest in the park. Between the 1930's and late 1990's significant increases in stocking densities occurred in the conifer forests of southern California largely as a result of fire suppression activities. This transformation has been typified by less open old-growth forest and denser, white-fir dominated climax stands. (Minnich et al, 1995) The consequences have been declines in bird diversity and increase risks for catastrophic fires.

The following table represents an overall guide to stocking conditions in the Project design:

Cuyamaca Rancho SP Reforestation Project							
Target Stocking Conditions for Mixed Conifer Stands							
		Conifer Seedlings Avg Trees Per Acre (Onsite)	Percentage Range (Stem Count) Guidelines for Planting				
			Jeffrey Pine	Coulter Pine	Incense Cedar	Sugar Pine	White Fir
Initial Stocking		250	65%	15%	5%	8%	7%
1-2 Yr Monitoring							
If Less Than :	70%	175					
Interplant to a density of:	100%	250	65%	15%	5%	8%	7%
4 Year Monitoring							
If Less Than:	70%	175					
Interplant to a density of:	100%	250	65%	15%	5%	8%	7%
8 Year Monitoring							
If Less Than:	60%	150					
Interplant to a density of:	80%	200	65%	15%	5%	8%	7%
10 - 15 Year Monitoring							
If More than:	80%	200					
Thin to:	50%	125					
If Less than:	40%	100					
Interplant to:	50%	125	65%	15%	5%	8%	7%
20-30 Yr Monitoring:							
Goal Is:	40%	100					
If < Goal Interplant to:	60%	150					
If > Goal Thin to:	50%	125	65%	15%	5%	8%	7%
					revised:	*5/26/2011*	

Distribution of Age Classes/Sustainable Management

The CRSP is operating under a comprehensive Vegetation Management Plan (Exhibit 2: Vegetation Management Plan, CRSP). This plan addresses overall issues of park vegetation, habitat restoration and management into the future. The Project has been specifically designed to meet and exceed the objectives for vegetation management in this plan. The overall goal of the Vegetation Management Plan is to maintain ecological functioning by: a) reestablishing forest canopy, and b) maintaining or enhancing biodiversity. No commercial harvest levels are planned in the Project Area (See Exhibit 4: No Commercial Timber Harvest Declaration Letter). The Vegetation Management Plan is sanctioned and monitored by the California State Parks; the authority for executing the plan comes from California Public Resources Code (Sections 5003, 5019.5, and 5002.2) and the Department Operation Manual Policy (DOM Sections 310, 1104, and 700).

Structural Elements (Standing and Lying Dead Wood)

The focus of the Project is to reestablish the mixed conifer forest and pine-oak woodland in the appropriate locations in the park to restore and maintain a mosaic of native habitat types. The Project activities will perpetuate mature growth and uneven-aged stands of forest to produce structural elements, such as standing and lying dead wood, in a self-sustaining manner over time.

Planting Site 2008
(photo: Nancy Budge)

Currently, standing dead and lying dead wood are abundant in the Project Area, making up over 87% of the forest carbon pool in the Project Area, due to the impacts of the 2003 Cedar Fire. Site preparation activities including mastication and broadcast burning will reduce dead wood biomass. However, given the large quantities of carbon in these pools, substantial deviation from the baseline scenario over time is not expected. These components will remain abundant during the first 20-40 years of the Project with decay rates in the range of 1%-3% annually. After this initial period of time, standing and lying dead wood are likely to decrease as a percentage of the forest carbon pools. This will continue until the reestablished conifer forest begins a natural cycle of maturity and mortality which may be expected after 100 to 150 years.

Cuyamaca Rancho State Park Reforestation Project Estimates of Current Forest Carbon Pool Components Based on Pre-Treatment Cruised Plots Through May, 2011			
Pool	***Carbon (tonnes/acre)***	***CO2e (tonnes/acre)***	***Percentage***
Standing Live	1.146	4.205	8.1%
Standing Dead	10.188	37.388	71.8%
Lying Dead	2.253	8.269	15.9%
Shrub/Forb	0.607	2.227	4.3%
Total	**14.193**	**52.090**	**100.0%**

J. Project Baseline: What Would Happen in the Absence of this Project? (*FPP 3.2 Reference: Section 6.1.1)*

The purpose of the following is to provide a qualitative assessment of the likely landscape scenario related to carbon stocks that would develop in the absence of the Project. This analysis takes into consideration the current site conversion to ceanothus/Chaparral, the capacity of the Project area for natural conifer regeneration, and the scope of management activities that would occur without the Project.

Site Conversion to Ceanothus/Chaparral

As stated in Dr. Janet Franklin's 2008 report to DPR, the results of survey data at CRSP showed that "…the greatest changes resulting from four years of post-fire vegetation dynamics in these formerly-forested stands were an overall increase in shrub cover, especially in sites dominated by *Ceanothus palmeri*, from 3% to 31%, and the dramatic increase in the cover of exotic herbaceous species, primarily annual grasses from 3% to 40%" (Franklin, 2008). The Vegetation Management Plan makes the following statement in explaining constraints to restoration of mixed conifer forest (MCF), "Stand replacement of MCF by oak woodland and shrubs is underway in large portions of this former habitat. It could take decades or centuries to return to MCF and may not due to long-term climate change." In the absence of the Project, shade intolerant brush and exotic annuals would be expected to persist for 50-years or more as the Chaparral matures and then becomes decadent, allowing the development of an overstory forest cover where a seed source for forest species is present. Given the lack of evidence for natural conifer regeneration specific to the Project sites, this is expected to take longer than a typical succession timeline.

Ceanothus Adjacent to Lookout Fire Road (2007)
(photo: Nancy Budge)

Natural Conifer Regeneration

The best available data on overall conifer regeneration in the park comes from the surveys done by Dr. Janet Franklin and her students after the 2003 fire. These include surveys taken on 38 forest stands in the park in 2004 and 2005, and then revisited in 2007 and 2008 (Franklin et al., 2006, Franklin, 2008, Bergman, 2009, Franklin and Bergman, 2011). Dr. Franklin's survey results to date show some slow and patchy natural forest regeneration in the park. Naturally generated seedlings were almost all Coulter pine and showed up in approximately 1/3 of the plots, primarily at lower elevations. In those plots, the average density was 11 juveniles per acre (28 per ha). Some dense patches of incense cedar seedlings were also found in one of the 40 stands surveyed as well as some limited regeneration of sugar pine (Franklin et al., 2006). These species were found typically in areas that experienced lower burn intensity and some retention of older trees. Dr. Franklin states "…the potential reestablishment of mixed conifer forest on the highest peaks of CRSP is likely to be very slow, limited in extent, and compromised by future fires and climate change" (Franklin, 2008). The Project area consists of a mosaic of sites across the landscape chosen for suitable conditions for conifer establishment and where natural regeneration is not occurring. The 2008-2011 pre-project inventory work showed an average of less than 16 conifer seedlings recruitment per acre on the Project sites. Considering 100 conifer trees per acre as a minimum stocking standard, less than 6% of the sampled area was stocked with natural conifer regeneration.

Ceanothus Adjacent to Middle Peak Fire Road (2011)
(photo: Nancy Budge)

Assessment of the Commercial Value of the Trees within the Project Area

The commercial value of the trees is near zero because of transportation costs and the lack of a forest products industry in Southern California which is limited to low value forest products including pallets, fence rails, firewood, and chips. A portable sawmill can be utilized to create small quantities of dimensional lumber for in-park, nonstructural projects using identified

hazardous trees within the park. These activities are never profitable because of the high levels of wood defect in hazard trees and clean up costs which are much greater than clean up costs found on a typical private timber sale.

Scope of Management Activities without the Project

In the absence of the Project, it is unlikely that any sort of comprehensive reforestation would take place in the park. There are statutes that give the California State Parks the authority to manage the park (Public Resources Code Section 5001) and to protect it from damage (Public Resources Code 5008). However, there are no statutes, policies or guidelines that require or fund restoration or reforestation actions. The District would have organized community-based tree-planting events such as that which occurred on Earth Day 2009 in the Green Valley Campground which is an area that has not been included within the Project boundaries. Due to the costs involved, these events are restricted to areas where little, if any, site preparation is needed. These volunteer efforts may have resulted in approximately 30-50 acres of reforestation in the park over time.

The attached letter from Richard G. Rayburn, Chief of Natural Resources Division, California Department of Parks and Recreation in 2009, explains that the department responds to only three post-fire circumstances (See Exhibit 9: Richard G. Rayburn's 3-25-2009 Letter). These include mitigation of severe erosion threats, mitigation of hazards such as removal of hazardous trees, and control of exotic species invasion. Of these three possibilities, mitigation of hazards and minor work to prevent erosion are included in the reasonable scope of management activities that would have occurred without the Project. Hazard mitigation work in the Project Area since the 2003 Cedar Fire has consisted of "Truck/Trails Maintenance" by CAL FIRE. These projects remove debris and potential hazard trees along main fire equipment access roads such as Lookout Fire Road and Middle Peak Road. Brush is removed 50' on either side of these roads; dead standing trees are felled and chipped on 100' either side of these roads.

Explicit Approval of the Project's Baseline

The CRSP Reforestation Project was explicitly approved by Richard G. Rayburn, Chief of Natural Resources Division, California Department of Parks and Recreation in 2009, prior to the Project submittal to the Climate Action Reserve (See Exhibit 9: Richard G. Rayburn's 3-25-2009 Letter). The current qualitative baseline narrative in this section of the Project Design Document has also been explicitly approved by Bill Herms, Deputy Director, Legislation, California Department of Parks and Recreation, Stephen Bakken, Forester II, California Department of Parks and Recreation, Gail Sevrens, Acting District Superintendent, Colorado Desert District, California Department of Parks and Recreation, and Jim Dice, Senior Environmental Scientist, Colorado Desert District, California Department of Parks and Recreation (See Exhibit 8: Explicit Approval of Baseline and Project Activities). The public vetting processes necessary to evaluate management and policy decisions concerning the Project activity have included full review under the California Environmental Quality Act (CEQA).

Lisa Gonzales-Kramer, Project Manager, California State Parks (photo: Paul R. Johnson)

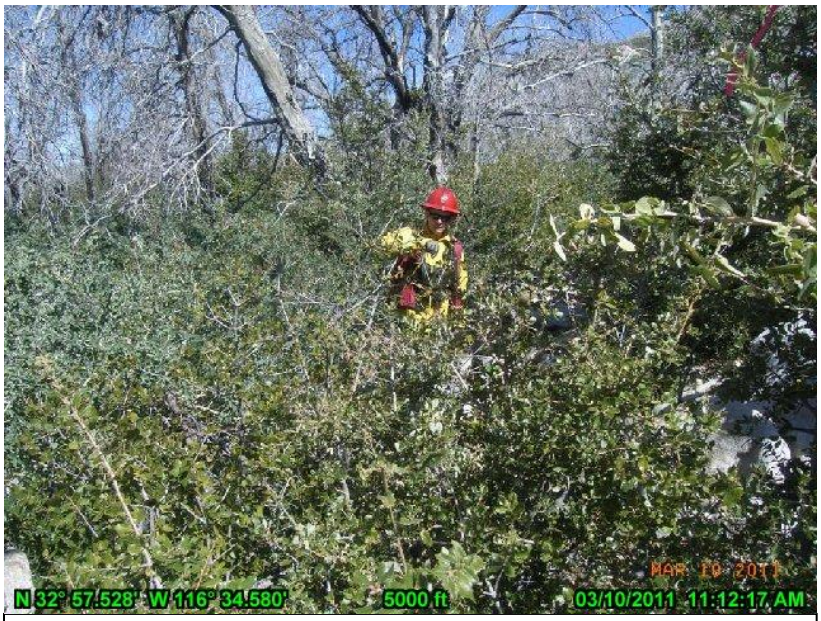
K. Monitoring, Reporting, and Verification
(*FPP 3.2 Reference: Sections 5.1. 6.1.1, 9.1.1.1, 10.3.1.3, 10.3.5)*

The Project incorporates systematic monitoring, reporting, and verification to assess progress towards the park's restoration goals, to meet the requirements of FPP 3.2, and to ensure that credited reductions are sustained for 100 years. Initial third party verification for project eligibility and impacts of site preparation activities will occur within 30 months of Project submittal. The First Period Forest Project Monitoring Report is submitted as an exhibit to this document (See Exhibit 10: First Period Forest Project Monitoring Report – CRSP Reforestation Project).

The carbon pools and sources accounted for in the Project for quantifying Project CO2e t reductions and removals are listed in Exhibit 11: CRSP Green House Gas Assessment Boundaries. Current monitoring on the Project includes monitoring of carbon pools impacted by site preparation activities. The long-term monitoring of carbon stocks on the Project will begin prior to completion of the planting phases. Additional data on the Project Area will be collected in conjunction with biological monitoring for survivorship and specific research studies such as the ceanothus research beginning in 2011. All Project monitoring data and reports will be collected and maintained at the Colorado Desert District Office of California State Parks.

Monitoring of Carbon Pools Impacted by Site Preparation Activities

A sampling methodology for the Project was developed to acquire data necessary to account for effects on carbon inventories associated with the site preparation activities of the Project (See Exhibit 12: Pre Treatment Inventory Plan – CRSP Reforestation Project).



Pre-Treatment Inventory Work
(photo: Gary Reese)

Sample plots have been systematically placed, within the park GIS, across the entire CRSP on a grid that is spaced at 5 chains by 5 chains (100 meters by 100 meters), which represents a plot for every 2.5 acres (~1 hectare). Each plot is identified by a unique identifier from 1 to 10983, which is a plot layer in the GIS. Each location has an associated UTM zone 1 (NAD83) coordinate and latitude/longitude which will become permanent locations for any current and future monitoring needs.

Pre-treatment data collection includes the following carbon pools and measurements:

Standing Live Carbon (Trees): Data are collected on standing live trees > 5" dbh including species (conifer and hardwood), diameter, height, height-to-crown base, status (live, live snags), cavities and nests.

Standing Dead Carbon (Trees): Data are collected on standing dead trees > 5" dbh including species (conifer and hardwood), diameter, estimated height when alive, height-to-crown base, status (snag, hard or soft) cavities and nests.

Lying Dead Wood: Data are collected on lying dead wood > 5" diameter (as determined by averaging the large end diameter and the small end diameters), with a minimum length of 8 feet, including species, diameter, length, and status (hard or soft).

Regeneration: Data are collected on trees < 5" dbh including species, and size class (0-2.9"dbh, 3-4.9"dbh).

Shrub/Forb (Grass) Cover: Ocular estimates are made and recorded as percent shrub/forb cover to the nearest 5% density and average height to the nearest foot for up to 3 brush/forb species.

Fuel Class Stratum: The fuel class stratum for each plot is identified from the Scott and Burgan photo series. (Scott and Burgan, 2005)

Through May, 2011, 69 plots have been cruised at pre-treatment sites (See Map CRSP 17: Cruised Pre-Treatment Plots, and Map CRSP 18: Identified Fuel Class Types). This data is summarized by Fuel Class Model Code as follows:

Cuyamaca Rancho State Park Reforestation Project Pre-Treatment Inventory Work							
	Fuel Class Model Code						
	GR1	GS1	GS2	SH1	SH2	SH5	TU1
	2 Foot Continuous Grass	Grass/ Shrub Mix, Shrubs <1'	Grass/ Shrub Mix, Shrubs 1'-3'	1 foot Sparse Shrub	1 foot Continuous Shrub	Heavy Shrub Load of 4'-6'	Trees with Shrub or Grass Understory
# Acres Planted To-Date	308.3		254.2			162.1	
# Plots Completed To Date	31		7			31	
Avg. % Shrub Cover	13.0		92.9			67.3	
Avg. % Shrub Height	4.4		5.0			5.1	
Standing Live Trees (per ac)	4.8						
Standing Dead Trees (per ac)	42.3		32.9			124.8	
Lying Dead Wood (logs/ac)	24.2		18.6			10.6	

Inventory Items Deferred to the Project's Second Site-Visit Verification

Several items have been deferred to the second site-visit verification. At that time all site preparation and planting activities for the Project will be completed. Items listed below will be prepared for the second site-visit verification.

- All necessary pre-treatment data will be collected including strata typing and plot data collection so that a minimum of 20 plots have been collected in each stratum. This data will be used in the quantitative characterization of the baseline, which will be evaluated at the second verification.
- Computer simulations of the baseline (for 100 years from start of Project) and Project activity (for at least 10 years from year of second verification). A simulation of growth will be conducted for the purposes of planning and to provide information for annual reporting between the first and second verification, however, it will not be necessary to verify these simulations as no CRTs will accrue from them until after the second site-visit verification.
- The post-treatment inventory design is prepared. It will be implemented before the second verification but not for the first verification.
- The reversal risk rating will be available for the second verification.

Long-Term Inventory Monitoring of Carbon Pools

While implementation of a post-treatment inventory monitoring plan is deferred for purposes of verification, the inventory methodology for the Project Area has been prepared (See Exhibit 13: Inventory Monitoring Plan – CRSP Reforestation Project). This allows both the Forest Owner and the Verifier to understand the plan and provides guidance for collecting inventory data for the second site-visit verification.

2008 Planted Seedling in 2011
(photo: Nancy Budge)

The design of the inventory relies on a systematic sample of nested fixed area plots. Carbon pools are estimated using direct measurements, wood density factors, volume and allometric models. The Scott and Burgan (2005) fuel model classification is used for the post-treatment monitoring inventory to classify the shrub/forb carbon pool and to aid in the risk assessment. A photo record of each plot, with the use of a GPS capable camera if available, documents condition. Sample plots have been systematically placed, within the park GIS, across the entire CRSP on a grid that is spaced at 5 chains by 5 chains (100 meters by 100 meters) as described in the previous section.

Data entered for each plot comprises 33 items including information on plot location, slope, aspect, standing trees, regeneration, lying dead wood, shrub/forb cover, fuel class, and navigation to the next plot. Check cruising is conducted on the post-treatment inventory with a minimum of 5% of the plots. Due to the operational issues associated with monumenting plots in a state park, locating plots is accomplished using GPS coordinates to navigate to plot centers.

Treatment unit and plot data are entered in an excel spreadsheet designed for the Project. Treatment unit data is taken from the park's GIS. Plot data is entered from the plot forms. Each plot is assigned a treatment unit identifier. The spreadsheets allow for quality control pivot tables to be created, which facilitate the checking for errors in measurement or transcription. The biomass of each carbon pool is converted to carbon by multiplying by 0.5 (FPP 3.2, p110). Carbon is converted to CO2 by multiplying by 3.67.

The target schedule for conducting inventory is on a periodic basis with at least 25% of the total inventory plots being sampled every 3 years. The initial year for conducting inventory sample plots will depend on the growth rate of the trees and the scheduling of the second site verification. Inventory sampling in the Project Area will begin when a sufficient number of trees meet the minimum measurement threshold of 5 inches dbh. The 3-yr rotating schedule will be initiated within enough time to ensure that an inventory of the entire Project Area is completed prior to the second site verification with plot data no older than 12 years.

Biological Monitoring for Survivorship

Short term monitoring of planted seedling survival and efficacy of competing vegetation treatments will be addressed through a separate data collection and analysis process called Biological Monitoring (See Exhibit 13: Inventory Monitoring Plan – CRSP Reforestation Project , *Appendix II – Biological Monitoring Protocol*). The current goals of biological monitoring are to help determine efficacy of planting operations including contractor protocols, site preparation techniques, site selection, and use of seedling protection such as vexar tubing, shade cards, and eco-cover mats. Monitoring results and observations are expected to lead to adaptive management adjustments on a site by site basis to achieve target goals for species composition and density.

2011 Seedling with Shade Card
(photo: Nancy Budge)

Data Collection, Organization, and Retention

All Project monitoring data and reports will be collected and maintained at the Colorado Desert District Office of California State Parks. In addition, the tracking of Project polygon boundaries are managed and recorded by the Colorado Desert District GIS personnel (See Exhibit 14: CRSP Site Polygon Tracking Process). The records retention policy for the data will be for a minimum of 200 years in order to meet the requirements of FPP to keep all documents and forms related to the Project for a minimum of 100 years after final issuance of CRTs.

Currently, the data is organized in the GIS system at the district office. All planted areas, or polygons have GIS coordinates and include data on site preparation work, survey work, planting date, species, and other operating details. Plot cruise and survey information is linked to the unique GIS polygons to provide ongoing inventory information. Three separate spreadsheets contain the biological monitoring, pre-treatment carbon inventory, and the post-treatment carbon monitoring. Each of these data sets may be cross-referenced with each other and to the GIS using both unique polygon identifiers and unique plot grid system.

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