

**Annual Report for 2012**

**Woods Cove Development**

**Mitigation Plan Work Program**

**(January 2012 through December 2012)**



*Prepared for:*

**Woods Cove Homeowners Association**

*Prepared by:*

**Native Vegetation Network**

Valerie J. Haley, Project Manager and Botanist

Karen Williams, Graphics Designer

Christine McKenna, Admin. Assistant

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## CHAPTER 1.0 INTRODUCTION

The year 2012 represented Year 10 of the long-term maintenance and monitoring phase of the Coastal Prairie Conservation Easement. In this phase, reports are prepared every other year to document mitigation activities. The long-term maintenance and monitoring period for the Conservation Easement will continue for five more years. Small-scale plantings (approximately 250 plants) were conducted in winter of 2012.

### PROJECT DESCRIPTION

The Coastal Prairie Conservation Easement provides habitat for several special status plant species and sensitive plant communities. The sensitive communities present are coastal terrace prairie, seasonal wetland, and oak woodland/redwood forest mosaic. Known populations of the following rare and/or endangered plant species also occur: Santa Cruz tarplant (*Holocarpha macradenia*), San Francisco popcorn flower (*Plagiobothrys diffusus*), Santa Cruz clover (*Trifolium buckwestiorum*), and Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*). Locally unique plant species associated with coastal prairie habitat include coast coyote thistle (*Eryngium armatum*), gum plant (*Grindelia* sp.), Johnny jump-up (*Viola pedunculata*), coast lotus/trefoil (*Hosackia gracilis*), and yellow calochortus lily (*Calochortus luteus*).

Construction activities for the Woods Cove Development (previously known as Graham Hill Estates) are complete, and all of the lots have sold. The Woods Cove Homeowners Association is now responsible for managing the Coastal Prairie Conservation Easement, whereas, Standard Pacific Homes was responsible in the past.

The lots are one half to one-acre minimum size, and will be primarily developed outside of the coastal prairie habitat. However, about 0.63-acre of coastal prairie was impacted by grading for the entrance road, lane widening, and portions of several lots. In addition to the residential lots, a Coastal Prairie Conservation Easement area (approximately 15.6 acres total) was established for the project. To facilitate discussion, three areas or sections have been designated, the Northern Coastal Prairie Conservation Easement area, the Central Coastal Prairie Conservation Easement area, and the Southern Coastal Prairie Conservation Easement area (Figure 1). The Northern Conservation Easement area borders on the Santa Cruz Horsemen's Association equestrian facility, and includes a 0.97-acre revegetation area. Technically, there is only one coastal prairie conservation easement.

As mitigation for impacts to sensitive botanical resources, the development will preserve and manage 10.5 acres of rare and endangered plant habitat and coastal prairie habitat, 1.5 acres of seasonal wetland, and approximately 2.1 acres of oak woodland habitat. As additional mitigation, 0.97 acres of grassland is in process of being revegetated with native coastal prairie species. Performance standards have been established for the revegetation area. According to the "Graham Hill Showgrounds Development Habitat

Mitigation Plan” (Habitat Restoration Group, June 1995), there should be a minimum of 55% vegetative cover of native species in the revegetation area at the end of the five-year establishment period. Further information on the project description and its impacts may be obtained from the “Graham Hill Showgrounds Development Draft EIR” (ESA, 1993) prepared for the County of Santa Cruz.

As part of project permitting and the CEQA process, the Habitat Restoration Group (HRG, June 1995) prepared the “Graham Hill Showgrounds Development Habitat Mitigation Plan”. The intent of the Mitigation Plan is to provide mitigation measures and management actions for the sensitive botanical resources at the project site with an emphasis on actions that mitigate for impacts to coastal prairie habitat. Required mitigation activities include the control of invasive, non-native species, mowing management, revegetation of 0.97 acre of grassland with native species, and fenced conservation easement areas, preservation of special status plant species, monitoring, and reporting.

## **GOALS OF THE MITIGATION PLAN**

The overall goal of the mitigation plan is to achieve a no-net-loss of coastal prairie habitats, including habitat size, plant population and viability, and long-term management of the prairie, oak woodland, oak woodland/redwood forest mosaic, and seasonal wetland habitat. This goal will be achieved through the following actions:

1. Re-create coastal prairie within suitable habitat areas of the project site at a minimum of a 1:1 replacement ratio; protect and manage through a dedicated conservation easement. As currently depicted on the revised site plan, 0.97 acre of coastal prairie will be revegetated.
2. Preserve and manage undisturbed coastal prairie habitat through a dedicated conservation easement:
  - a. Preserve and manage undisturbed State-listed plant species (i.e., Santa Cruz tarplant, San Francisco popcorn flower) and their habitat.
  - b. Preserve and manage undisturbed locally unique coastal prairie plant species/habitat (i.e., coyote thistle, grindelia/gum plant, and coast trefoil).
  - c. Enhance coastal prairie habitat through the control of French broom and other invasive, non-native plant species.
3. Preserve and manage undisturbed oak woodland habitat through a dedicated preservation easement.

4. Provide a minimum 25-foot wide buffer area between the coastal prairie and adjacent land uses/other habitats to minimize indirect impacts to the coastal prairie and oak woodland habitats; preserve the buffer area through dedicated conservation easement (Figure 1).
5. Conserve forest habitats outside the development areas through a dedicated preservation easement.
6. Encourage preservation and management of the oak woodland/redwood forest mosaic habitat within the development areas through adherence to woodland/forest development and monitoring guidelines.
7. Maintain the local gene pool of native vegetation by planting, as appropriate, locally collected native species within the conservation easement areas and managing the easement areas to support their survival.
8. Control invasive, non-native plant species to minimize competition with native species.

## **MITIGATION PLAN WORK PROGRAM**

In November 1997, The Habitat Restoration Group prepared a "Revised Graham Hill Showgrounds Development Habitat Mitigation Plan Work Program" which provided detailed information on the implementation of mitigation measures to be conducted during the five-year maintenance and monitoring period. This Work Program was approved as revised by Kim Tschantz of the County of Santa Cruz Planning Department.

This eleventh annual report documents the mitigation activities that have been implemented under the Work Program from January 2012 through December 2012 in the Coastal Prairie Conservation Easement areas. During this period, Native Vegetation Network's botanist, Valerie Haley has been managing and monitoring the Coastal Prairie Conservation Easement areas.

**CHAPTER 2.0**  
**SUMMARY OF MITIGATION ACTIVITIES**  
**IN THE COASTAL PRAIRIE CONSERVATION EASEMENT AREAS**

**CONTROL OF INVASIVE, NON-NATIVE PLANT SPECIES**

The control of invasive, non-native plant species primarily used manual and mechanical methods. No herbicide was applied in 2012. Under the supervision of botanist, Valerie Haley, Native Vegetation Network (NVN) field technicians conducted the manual and mechanical removal. Similar to recent years, the following invasive, non-native plant species and weeds were the focus of removal efforts in 2012: French broom, Italian thistle (*Carduus pycnocephalus*), English ivy, yellow dock (*Rumex crispus*), poison hemlock (*Conium maculatum*), black acacia (*Acacia melanoxylon*), ripgut brome (*Bromus diandrus*), prickly clover (*Trifolium angustifolium*), wild radish, and sheep sorrel (*Rumex acetosella*).

Overall, wetland weeds such as poison hemlock, velvet grass (*Holcus lanatus*) and yellow dock (*Rumex crispus*) were not as much of a problem in 2012 due to dry weather conditions compared to normal precipitation years. According to central coast weather forecasters, last winter was deemed the driest on record for the last one hundred years.

**French Broom Removal**

Over the last twelve years, removal efforts have greatly reduced the levels of French broom in the open grasslands. Seedlings still emerge in the center of the prairie in the central and southern portions of the Coastal Prairie Conservation Easement. Some of the woodland edges and ditches along Graham Hill Road still support French broom. Four crew days were spent removing broom in 2012.

During early spring 2012, there was periodic hand pulling of French broom plants, while the soils were wet and the roots were easy to remove. Figure 2 shows field technicians removing French broom in the 25-foot wide buffer along the western portion of the Conservation Easement. The French broom plants were pulled before they were in flower and had set seed; therefore, there were no seeds dispersed during broom removal. The pulled material was left scattered in the woods to decompose. Removal efforts concentrated on infestations in prairie habitat and along woodland edges.

**Thistle and Poison Hemlock Control**

NVN technicians patrolled the redwood and coast live oak groves within the conservation easement for poison hemlock and thistle plants. Spot manual control of Italian thistle (*Carduus pycnocephalus*), slender-flowered thistle (*Carduus tenuiflorus*), and poison hemlock (*Conium maculatum*) was also performed in the Northern and Central Conservation Easement areas. A few of the thistle patches are adjacent to the

easement fence and extend into the residential lots. Thistle infestations by the historical red shed and the information center (sales office) were removed. Depending on plant maturation, removed thistle plants with flower heads were bagged and taken to the landfill. The plants were removed by a pick or shovel with care to minimize ground disturbance. The poison hemlock was primarily removed near the historical red shed and along the oak woodland edge. Thistle plants were removed adjacent to the previous sales office, and at the west end of the seasonal wetland.

### **Black Acacia Control**

Black acacia saplings growing in the Southern Conservation Easement area were hand dug or pulled out in the spring 2012. This invasive, non-native tree species has been introduced from nearby residential yards and street plantings. Seedlings were removed by the bus stop and coastal prairie habitat located in the southeast corner of Southern Conservation Easement area. A few of the residential yards along Mosswood Ave. have mature black acacia trees that drop seeds into the southern end of the Conservation Easement. Acacia roots also sprout new trees.

### **Prickly Clover**

Of concern, is a large patch of invasive, prickly clover (*Trifolium angustifolium*) that grows on the south side of the main entrance. This has been a problem area in recent years, and occurs adjacent to a colony of the rare Santa Cruz Tarplant. NVN field technicians spent a day weeding prickly clover and bagging seed heads.

### **Velvet Grass, Wild Radish, and Yellow Dock Removal**

Overall, wetland weeds such as velvet grass (*Holcus lanatus*) and yellow dock (*Rumex crispus*) were less prevalent in 2012 due the very dry winter and spring in 2012. Velvet grass, yellow dock, and wild radish continue to be problematic in the seasonal wetland that occurs to the north of the main entrance. The NVN crew used shovels to dig out yellow dock in the seasonal wetland, especially where there were concentrations along the edges of the drainage swale. A portion of the velvet grass (*Holcus lanatus*) was hand-pulled, and the rest was weed-whacked several times to reduce seed production.

## **MOWING MANAGEMENT**

As specified in the Habitat Mitigation Plan, the Coastal Prairie Conservation Easement areas (including the seasonal wetland) were mowed in spring 2012 and fall 2012. Each mowing event required two days of tractor work to mow the three Coastal Prairie Conservation Easement areas. Ron Vaillencourt from Ron's Earth Service mowed the coastal prairie and seasonal wetland habitats on June 18 and 19, 2012. The fall mowing was conducted on October 8 and 9, 2012. A John Deer 4-wheel drive tractor with a mowing attachment was used, so that the remaining standing material was 6 to 8



inches tall after cutting. Valerie Haley coordinated the mowing activities and notified the tractor operator when to mow. Areas inaccessible by tractor (e.g., under tree canopies) along Graham Hill Road and by the main entrance gate were weed-whacked. Prior to the spring mowing, selected wildflower fields having concentrations of soap plant (*Chlorogalum pomeridianum*), rare Santa Cruz tarplant, and yellow brodiaea were roped off to exclude mowing, so that the flowers could mature and produce seed. Prior to the fall mowing, the Santa Cruz tarplant and Gairdner's yampah plants in seed were flagged off to prevent mowing, so they could complete their seed maturation process. Figure 3 shows the fall 2012 mowing in process in the northern portion of the Conservation Easement.

## **DEBRIS REMOVAL**

In 2012, Native Vegetation Network field technicians picked up trash and debris two times in the Coastal Prairie Conservation Easements, and along Graham Hill Road. The worst areas of debris occurred along Graham Hill Road. The majority of the debris was from passing vehicles, and included bottles, fast food containers, and paper or plastic waste.

## **SUPPLEMENTAL WATERING**

Due to dry weather in winter and spring 2012, two supplemental watering events were conducted. The new plantings in the revegetation area were watered with water that had been trucked to the site in mid April and Mid May 2012. The known population areas of Santa Cruz Tarplant were also watered in April and May.

## CHAPTER 3.0

### SUMMARY OF ACTIVITIES IN THE REVEGETATION AREA

During 2012, activities in the revegetation area have included weed eating (Figure 4), vegetation monitoring, planting, weeding, slug control and mowing. Performance criteria were established for the revegetation area in the "Graham Hill Showgrounds Development Habitat Mitigation Plan" (HRG, June 1995). The summer following seeding and transplanting there should be 35% cover of native plant species, and by the summer of Year 5 there should be a minimum vegetative cover of 55% native species (*ibid.*).

#### WEED CONTROL

Weeding was mainly done around the new plantings and the rare Santa Cruz Tarplants that grow naturally near the southern boundary of the revegetation area (Figure 1).

One crew day was spent hand weeding the following species: sheep sorrel (*Rumex acetosella*), purple velvet grass (*Holcus lanatus*), yellow dock (*Rumex crispus*), wild radish (*Raphanus sativus*), hairy cat's ear (*Hypochaeris radicata*) and riggut brome. The majority of the weeding was done in spring 2012. Weeding was done mainly around the plants that had been previously transplanted or planted from container stock. In the spring, hairy cat's ear was hand-pulled and hoed to remove young plants. In addition, portions of the revegetation area near Graham Hill Rd. and along the southern boundary of the Revegetation Area were weed-whacked several times over the growing season, when the non-native weeds and grasses exceeded 14 to 16 inches in height. This served to reduce competition between the native plants and weedy non-natives.

#### CONTAINER STOCK PLANTING FEBRUARY 2012

The common name, container types, and the quantities planted in March 2012 are listed in Table 1. Native Vegetation Network personnel planted 1/3 of the plants near Graham Hill Rd and 2/3 of the plants along the southern boundary of the revegetation area. The following native species were planted: blue-eyed grass (75 two-inch pots), California butter cup (25 four-inch pots), gumplant (25 four-inch pots), California oatgrass (75 salvaged clumps), and soap plant (50 bulbs). All of the container stock was grown from site-collected native seed and propagation material. The native plants were maintained in NVN greenhouses prior to out planting in the revegetation area. Twenty-seven planting areas, six feet in diameter were prepared by removing non-native vegetation. The areas were cleared bare earth using a weed trimmer prior to planting. No supplemental fertilizer was applied.

**Table 1. Container Stock Planted in the Revegetation Area, March 2012.**

<b>Common Name</b>	<b>Container Type and Quantity</b>
Blue-eyed grass	75 two-inch pots
California Oatgrass	75 eight-inch clumps
California Butter Cup	25 four-inch pots
Gum Plant	25 four-inch pots,
Soap Plant	50 Bulbs

### **SUPPLEMENTAL WATERING**

Due to dry weather in winter and spring 2012, two supplemental watering events were conducted. The new plantings in the revegetation area were watered with water that had been trucked to the site in mid April and Mid May 2012.

## CHAPTER 4.0 MONITORING

### COASTAL PRAIRIE CONSERVATION EASEMENT AREAS

Monitoring activities in the prairie conservation easement areas included special status plant surveys, reconnaissance surveys, and photodocumentation from established photostations.

#### Special Status Plant Surveys

Starting in March 2012, the Coastal Prairie Conservation Easement areas were surveyed at 3 to 4 week intervals for special status and locally unique plant species. The surveys focused on the areas where such species had been documented in recent annual surveys, and known locations depicted in the "Graham Hill Showgrounds Development Habitat Mitigation Plan" (HRG, June 1995). Field notes were recorded on the approximate number of special status plants present (Table 2). The current locations of the populations were delineated on the site plan (see Figure 1).

A significant result of the surveys was that the population sizes were down for all of the rare plants monitored, especially Santa Cruz Tarplant and Gairdner's Yampah. San Francisco Popcorn flower also had fewer individuals in spring 2012. The reduction in the number of individuals observed was largely due to the very dry weather in winter and spring 2012.

Figure 1 depicts the locations of the following sensitive plant species observed in 2012: San Francisco popcorn flower, Santa Cruz tarplant, Gairdner's yampah, coyote thistle, coast trefoil, and gum plant/grindelia. No Santa Cruz clover was observed in 2012, and no Santa Cruz tarplant was observed in the Southern Coastal Prairie Conservation Easement area. Table 2 summarizes the approximate numbers of individuals of these special status species according to each of the three Coastal Prairie Conservation Easement areas.

**Northern Conservation Easement Area.** In the northern portion of the Conservation Easement only 150 to 175 Santa Cruz Tarplants were observed in 2012 compared to 600 to 650 plants in 2010. San Francisco Popcorn flower also had fewer individuals in spring 2012. Fifty to 75 popcorn flower plants were observed in spring 2012 compared to 275 to 300 plants in 2010. Fewer coast trefoil were observed in 2012, 40 to 45 plants compared to 60 to 70 plants in 2010

**Central Conservation Easement Area.** By the main entrance, only 600 to 650 Santa Cruz Tarplants were observed in 2012 compared to 850 to 900 plants in 2010.

The other population area of Santa Cruz tarplant closer to the emergency exit by Deer Path Rd. also decreased significantly. Valerie Haley observed 300 to 325 plants in

spring 2012 compared to the 800 to 850 plants in 2010. This area was also hand weeded and scraped in early September 2012.

The numbers for Gairdner's Yampah were also down in the central portion of the easement near Lots 9 and 10, approximately 1,200 to 1,300 plants were observed in spring 2012 compared to 1,800 to 2,000 plants in spring 2010. Predation of Yampah tubers by gophers was also observed. No individuals of San Francisco popcorn flower plants were observed near the main entrance to the subdivision, at the north end of the central conservation easement (Figure 1).

**Southern Conservation Easement Area.** Four individuals of Gairdner's yampah were observed in late spring 2012 near the woodland along Graham Hill Road. This represents a slight decrease compared to last year (Figure 1). According to the "Graham Hill Showgrounds Development Habitat Mitigation Plan" (HRG, June 1995), Santa Cruz tarplant had been observed previously in two locations in the Southern Conservation Easement; however, no Santa Cruz tarplant has been observed in these locations to date. Approximately 50 to 55 coast trefoil plants were counted in the Southern Coastal Prairie Conservation Easement (Table 2).

**Table 2. Results of Sensitive Plant Species Surveys  
Conducted in Spring and Summer 2012**

<b>Plant Species</b>	<b>Status Code</b>	<b>Approximate Number of Individuals</b>
<b>Northern Coastal Prairie Conservation Easement Area:</b>		
Coast Trefoil	CNPS List 4 Locally Rare	40 - 45
Coyote Thistle	Locally Rare	8 - 10
Gairdner's Yampah	FSC CNPS List 4 Locally Unique	40 - 50 (planted) 35 - 45 (natural)
Grindelia/Gum Plant	Locally Rare	75 - 80
Narrow-leaved Mule's Ear	Locally Rare	100 - 125
San Francisco Popcorn Flower	State Endangered CNPS List 1B	50 - 75
Santa Cruz Tarplant	State Endangered CNPS List 1B	150 - 175
<b>Central Coastal Prairie Conservation Easement Area:</b>		
Coast Trefoil	CNPS List 4 Locally Rare	40 - 45
Coyote Thistle	Locally Rare	480 - 500
Gairdner's Yampah	FSC CNPS List 4 Locally Rare	1,200 - 1,300 250 - 300
Grindelia/Gum Plant	Locally rare	275- 300
San Francisco Popcorn Flower	State Endangered CNPS List 1B	None
Santa Cruz Tarplant	State Endangered CNPS List 1B	600 - 650 (new area 2006) 300 - 325
<b>Southern Coastal Prairie Conservation Easement Area:</b>		
Coast Trefoil	CNPS List 4	50 - 55
Gairdner's Yampah	FSC CNPS List 4 Locally Rare	4

**Unites States Fish & Wildlife Service Codes:**

FSC = Federal Species of Concern

**California Native Plant Society (CNPS) Codes:**

List 4 = Plants of Limited Distribution, a watch list.

List 1B = Plants Rare, Threatened, or Endangered in California, but more common elsewhere.

## Reconnaissance Surveys/Site Inspections

During the growing season, Valerie Haley inspected the Coastal Prairie Conservation Easements areas three times for maintenance needs and site condition. This was often done concurrently with the special status plant surveys. During the inspections, areas having high levels of weeds or invasive, non-native plant species were noted. Problem debris areas were also determined. Field technicians were instructed on how and where to conduct the needed maintenance activities. Trash was picked up several times along Graham Hill Rd. in 2012

**Fallen Oak Trees.** Several mature coast live oaks died in the woodland at the southwest corner of the Conservation Easement near Mosswood Avenue. The trees were blown over during windstorms.

**Declining Ponderosa Pine.** During the surveys, a declining ponderosa pine was observed to the east of Lot 13 near the historical red shed (Figure 1). The pine appears drought stressed and most of the needles have turned brown (Figure 6). Red sap tubes associated with terpine beetles are evident on the bark.

**Invasive, Non-native Plants.** Of concern, is a large patch of invasive, prickly clover (*Trifolium angustifolium*) that grows on the south side of the main entrance. This has been a problem area in recent years, and occurs adjacent to a colony of the rare Santa Cruz Tarplant (Figure 4). Slender-flowered thistle continues at low levels primarily in the central conservation easement. In three areas, patches of thistles occur by the easement fence and extend past the fence onto the homeowners lots. Most of the thistle plants have been removed from a portion of the easement that is adjacent to the previous sales office. Half a crew day was spent removing seed heads of prickly clover plants near the entrance to Woods Cove. Three crew days were also spent pulling French broom and black acacia near the easement fence along Graham Hill Road. As noted in previous years, black acacia saplings occur in the southeast corner of the Southern Coastal Prairie Conservation Easement area. This is due to a large mature black acacia tree on the adjacent property. There are also several black acacia trees in the woodland portions of the site, including one large tree south of Deer Path Rd.

As expected, French broom seedlings continue to emerge from the soil seed bank. The majority of the large French broom shrubs have been removed within the conservation easements; however, "carpets" of seedlings less than 10 inches tall still occur in certain areas. Mowing the Conservation Easement areas in spring and fall has helped to keep the plants under a foot tall; however, additional control will continue to be necessary. Follow-up manual removal is planned for 2013. Hand removal efforts have greatly reduced the levels of thistle species and poison hemlock in the Central Conservation Easement area.

**Wildflower Displays.** In general, the wildflowers were shorter and smaller in stature in spring 2012 due to the lack of rainfall compared to normal rainfall years. Yet, the

flowers were more visible, since the grasses were also shorter. The southernmost meadow by Mosswood Ave. had the best wildflower displays in spring 2012. Patches of bright yellow California buttercup, blue-eyed grass (native purple iris) and coast trefoil (yellow and pink) were common in the coastal prairie habitat. Four patches of coast trefoil and scattered stands of blue-eyed grass (*Sisyrinchium bellum*) and California buttercup (*Ranunculus californicus*) were observed.

To the north, patches of yellow brodiaea, blue-eyed grass, yellow calochortus lily (*Calochortus luteus*), and Johnny jump-up (*Viola pedunculata*) were observed in the Central Conservation Easement. Narrow-leaved mule's ears, and coast trefoil were observed in the Northern Conservation Easement. These plant species are considered locally rare species by the local chapter of the California Native Plant Society.

**Photodocumentation.** Repeat photographs were taken in spring and fall 2012 from the 14 photostations that were established in spring 1998. Their locations are depicted in Figure 1. From most of the photostations, a panorama of 3 to 4 photographs was taken. The purpose of the photographs is to record changes over time, primarily focusing on the revegetation area and areas with sensitive botanical resources (e.g., populations of special status plants and seasonal wetland). Photostations 1 through 5 document the revegetation area. Photostations 6 through 10 are located in the Central Coastal Prairie Conservation Easement area. Whereas, photostations 11 through 14 are located in the Southern Coastal Prairie Conservation Easement area. Figures 2 and 3 show maintenance activities (broom removal and mowing) in the Conservation Easement. Figure 3 also provides an overview of the Northern Conservation Easement after the fall mowing. A declining ponderosa pine occurs in the Central Conservation Easement (Figure 6).

## **MONITORING OF REVEGETATION AREA – 2012**

Monitoring activities performed in the revegetation area included: vegetation sampling using belt transects, maintenance inspections, and photodocumentation. Valerie Haley, project botanist, has served as the site monitor. The approximately one-acre revegetation area is located near the northern boundary of the Northern Conservation Easement adjacent to the equestrian facility (Figure 1).

### **Belt Transect Sampling Methods**

In accordance with the Revised Mitigation Plan Work Program (HRG, November 1997), vegetation sampling of the Revegetation Area was conducted in spring 2008, the tenth spring after the initial seeding and planting activities. Year 2010 represents Year 12 of the monitoring program, the twelfth time that belt transect sampling was performed. Data on species composition were recorded on April 20, 2012. The locations of the belt transects have a stratified random design, and their locations vary slightly from year to year. Twenty belt transects were evaluated for absolute vegetative cover according to species. Each belt transect was 10 feet by 20 feet; therefore, the total area sampled was



4,000 square feet, which is approximately 10 percent of the revegetation area. The 20-foot side of the belt transect was oriented in a north to south direction. The field data recorded on absolute vegetative cover were used to calculate the relative vegetative cover (percentage) of the plant species growing within each of the 20 belt transects.

**Performance Criteria.** The data gathered from the belt transects was used to determine whether the revegetation area is proceeding towards the performance criteria that have been established for native plant species composition. According to the “Graham Hill Showgrounds Development Habitat Mitigation Plan” (Habitat Restoration Group, June 15, 1995), the first summer after seeding and transplanting of salvaged planting stock there should be a minimum of 35% cover of native species. In Year 5, the revegetation area should have a minimum cover of native plant species of 55%. If during the five-year establishment period the revegetation area does not have a high enough native species composition, then remedial measures (e.g., supplemental planting, increased weed control or changes in the mowing schedule) will need to be implemented. Trends in plant species composition should also consider that environmental conditions (i.e., drought, temperature) change from year to year, causing natural fluctuations in the proportions of native and non-native plants.

### **Belt Transect Sampling Results**

The relative vegetative cover according to species of the 20 belt transects is summarized in Table 3. For each belt transect, the native plant species are listed first with a subtotal for the vegetative cover of all of the native species. Then, the relative cover of each non-native plant species occurring in the belt transect is listed. In theory, the relative vegetative cover of the native species plus the cover of the non-native species should total 100%; however, the totals given in Table 3 for the total vegetative cover for some of the belt transects vary slightly from 100%. These variations may most likely be explained by rounding error during the data calculations.

**Native Species Composition.** In spring 2012, sixteen of the twenty belt transects listed in Table 3 had 55% or greater relative cover of native plant species, and therefore, have met the performance criterion for Year 5. The percent of native cover was higher in spring 2012 compared to spring 2010, when 10 of the belt transect had met the criterion for year 5. Six belt transects had 60% or greater native plant cover: Belts 2, 3, 4, 5, 9, and 14. The perennial, bent grass (*Agrostis pallens*) was the most prevalent native species (ranging from 28 to 45% vegetative cover) in the revegetation area, and occurs there naturally (not planted). In portions of the revegetation area, its creeping growth habit has formed extensive thick mats. Additional native plant species with 5% or greater relative vegetative cover include California oat grass, blue-eyed grass, short-stemmed sedge (*Carex brevissimus*), Gairdner’s yampah (*Perideridia gairdneri*), soap plant (*Chlorogalum pomeridianum*), common rush (*Juncus patens*), brown-headed rush, and slender rush (*Juncus tenuis*). Seven of these species were actively revegetated, excluding short-stemmed sedge and toad rush.

**Native Plant Species Richness.** In spring 2012, the number of different native species observed per belt transect ranged from five species (Belt 4) to 12 species (Belt 11). Revegetation efforts have increased the number of different native species (species richness). Native plant species introduced to the revegetation area via planting activities over the last nine years include: California oat grass, soap plant, Gairdner's yampah, coast trefoil, gum plant/grindelia, common rush, brown-headed rush, checker bloom (*Sidalcea malvaeflora*), common rush, blue-eyed grass, suncups, purple needlegrass, and coast coyote thistle.

**Species Performance.** Overall, the vegetation in the Revegetation Area was drought stressed in spring and summer 2012, and the grassland turned brown earlier in the spring than usual. More gopher damage was observed (Figure 7). Of the native species planted in recent years, the following have proved to be strong performers: Blue-eyed grass, soap plant, California oatgrass, brown-headed rush, common rush and slender rush. The rush species and soap plant plantings have not been disturbed by gophers; whereas, California oatgrass appears to be eaten more often. All three rush species and California buttercup planted in the revegetation are becoming established in wetter portions of the Revegetation Area.

### **Maintenance Inspections in the Revegetation Area**

Periodic maintenance inspections were conducted in the revegetation area (0.97-acre). The focus of the inspections was to note site damage and or problems that could interfere with the performance of the native vegetation.

Due to very dry weather in winter and spring 2012, drought stress was observed in the recent plantings. It was deemed necessary to do two supplemental watering events in April and May 2012. Gopher damage was common in the western half of the Revegetation Area (Figure 7). The rare Santa Cruz Tarplants also appeared stunted from lack of rainfall, and therefore were also watered in April and May.

Weedy clover species and wild ryegrass seemed less prevalent in spring 2012 compared to normal rainfall years. Scattered weeds of wild radish and yellow dock and the invasive Kikuyu grass were observed along the eastern portion of the revegetation area and seasonal wetland near Graham Hill Road. The plants appear to like the wet conditions found in the ditch that crosses the area. The majority of these weedy non-native plants have been removed.

The following weedy and/or invasive, non-native species were also observed and weeded: sheep sorrel (*Rumex acetosella*), purple velvet grass (*Holcus lanatus*), yellow dock (*Rumex crispus*), wild radish (*Raphanus sativus*), hairy cat's ear (*Hypochoeris radicata*) and ripgut brome. The majority of the weeding was done in spring 2012.

The heights of the non-native weeds and annual grasses were also monitored. When the average height of the standing vegetation in the revegetation area was

approximately 14.0 to 16.0 inches, a field technician was instructed to weed-whack portions of the area (Figure 4). This served to lower plant competition between the desired native species and the non-native ones. As usual, the area was also mowed twice in spring.

**Gopher Damage.** Gopher activity continues to be a problem in the western half of the Revegetation Area (Figure 7). Unfortunately, many of the planted Gairdner's yampah and California oatgrass plants were destroyed by gopher activity.

### **Photodocumentation of Revegetation Area**

Repeat photographs were taken in the Revegetation Area in spring and summer 2012 from the five photostations that were established in Spring 1998. Their locations are depicted in Figure 1. Most of the photostations have a panorama of 3 to 4 photographs, which document the various portions of the revegetation area. Next spring and summer, repeat photographs will be taken from the photostations. This will serve to help document changes in plant species composition. Figure 4 shows a field technician weed trimming non-native grasses in the Revegetation Area in spring 2012. The winter planting activities and portions of the Revegetation Area are depicted in Figure 5.

## CHAPTER 5.0 RECOMMENDATIONS FOR 2013

### COASTAL PRAIRIE CONSERVATION EASEMENT AREAS

#### 1. Continue Selective Weeding South of Main Entrance

As mentioned in this report, the invasive, non-native prickly clover, *Trifolium angustifolium* is prevalent south of the main entrance. This area also supports rare plants, including Santa Cruz Tarplant (*Holocarpha macradenia*), San Francisco popcorn flower (*Plagiobothrys diffusus*), and Gairdner's yampah. A very careful, selective weeding is recommended. Botanist, Valerie Haley will be present for weeding efforts so the NVN field technicians will be shown rare plants to avoid and target weeds for removal, primarily prickly clover and cat's ear (*Hypochaeris spp.*). The goal will be to enhance the populations of rare plants that occur in the area by lowering competition with weeds.

#### 2. Thatch Removal and Weeding of Santa Cruz Tarplant Population Area

The Santa Cruz Tarplant population area growing near lots Lots 8 and 9 (Figure 1) was smaller in 2012 compared to recent years in part due to drought and competition with non-native grasses. It is recommended that non-native grasses be weeded in spring and then in late summer the area should be raked with thatch rakes to remove the old grass duff layers such that more soil is exposed. Care should be taken not to disturb Santa Cruz Tarplant, Gairdner's yampah and California oatgrass growing in the area.

#### 3. Monitor Declining Ponderosa Pine

As shown in Figure 6, a tall ponderosa pine growing in the Conservation Easement has browning foliage and signs of bark beetles. It is possible that the brown needles are the result of drought stress, and that the ponderosa pine will recover. The pine should be monitored for health and vigor several times in 2013. If further decline and death occur, the pine should be removed such that the nearby mature oak trees, Conservation Easement fence, and lots are not damaged.

#### 4. Continue Control of Invasive, Non-native Plants

The following invasive, non-native species should be high priority for control/removal: French broom, Cape ivy, thistle species, Kikuyu grass, English ivy, black acacia, and poison hemlock. A combination of methods (chemical, manual and mechanical) should be used to be the most successful. Manual and mechanical methods will be implemented more than chemical ones due to the sensitive habitats and plant species present. Herbicides should be judiciously used for special cases. Herbicide treatment is recommended for the Kikuyu grass areas near Graham Hill Road along the eastern edge of the easement fence. There should be as little disturbance to the ground surface as possible, as this is known to provide open soil for additional broom and thistle seedlings to become established.

## **5. Continue Mowing Program Spring and Fall 2013**

To reduce the competition between the non-native grasses and the desired native prairie species, it is recommended that the spring and fall mowing program continue, as specified in the Habitat Mitigation Plan (HRG, June 1995). It is recommended that a mowing subcontractor perform this task. During the summer months, the site should not be mowed so the natural seed set of the native species is not disrupted. As last year, it is recommended that certain areas of late flowering special status plants (i.e., Gairdner's yampah and Santa Cruz tarplant) be roped off and protected so these plants may produce mature seed. It is likely that some of the wetter and/or inaccessible areas will need to be weed-whacked instead of mowed.

## **REVEGETATION AREA**

### **6. Weed-eating and Habitat Enhancement along Northern Boundary**

The San Francisco Popcorn flower population area along the northern boundary of the Revegetation Area has become smaller in size and number of individuals in recent years. This area is immediately adjacent to the Conservation Easement fence (Figure 1). Due to the fence being in the way, it is hard for the tractor mower to access the area. It is recommended that more weed eating be done along the fence, and that the cut material (mostly non-native grasses) be raked up and removed from the area. This will help to lower thatch build up. In late summer, selected small areas will be scraped of standing vegetation to expose barren soil. This will lower competition with non-native plants and create depressions for moist habitat, which San Francisco Popcorn flower prefers.

### **7. Continue Weeding Invasive Weeds**

Weeding should first focus on areas supporting rare plants, locally unique plant species, and recently planted areas. The following weedy species in the revegetation area should be targeted for removal: ripgut brome, English plantain (*Plantago lanceolata*), Italian thistle (*Carduus pycnocephalus*), hairy cat's ear, prickly clover (*Trifolium angustifolium*), sheep sorrel (*Rumex acetosella*), foxtail barley (*Hordeum jubatum*), purple velvet grass, yellow dock, rattlesnake grass, wild radish, and Italian rye grass (*Lolium multiflorum*). Methods for removal will be primarily manual (i.e., hand pulling, hoeing) in conjunction with weed whacking. In addition, late in the season the seed heads of a portion of these weedy species will be removed and bagged.

### **8. Continue Mowing and Weed-Whacking Program**

Depending on the extent of spring rains, the revegetation area will need to be either mowed or weed-whacked at about 3 to 4 week intervals, commencing in March 2013. The vegetation should be cut when it reaches an average of 14 to 16 inches in height. As possible, native plants should be selectively avoided. Care will be taken not to damage the Santa Cruz Tarplant population areas located along the south end of the revegetation area (Figure 1).

Table 3. Belt Transects Relative Vegetative Cover by Species  
Revegetation Area, April 2012 Data (Belts 11 through 20) (Cont'd.)

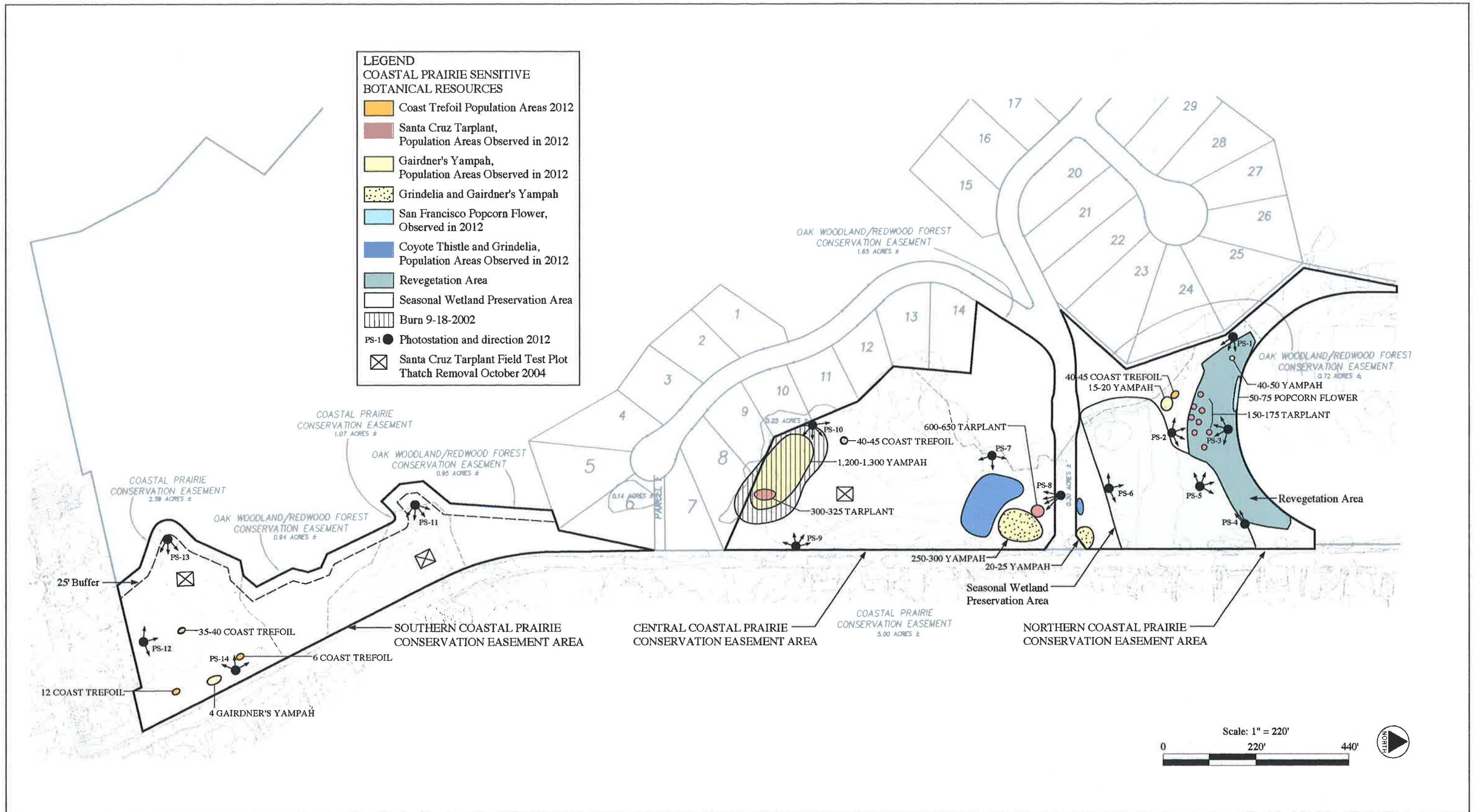
Scientific Name	Belt 11	Belt 12	Belt 13	Belt 14	Belt 15	Belt 16	Belt 17	Belt 18	Belt 19	Belt 20
<b>Native Plant Species</b>										
<i>Agrostis pallens</i>	35	25	35	30	30	30	38	30	32	30
<i>Brodiaea</i> sp.										
<i>Calandrinia ciliata</i>										
<i>Callitriche verna</i>										
<i>Calochortus luteus*</i>			2							
<i>Camissonia ovata</i>	2	6	2	4		2		2		
<i>Carex brevissimus</i>		4	4			2				
<i>Carex densa</i>	5	4	2	2	4	4	4	2	2	6
<i>Chlorogallum pomeridianum</i>	2	6	4	10	6	4	6	2	2	4
<i>Danthonia californica</i>										
<i>Eryngium armatum*</i>										
<i>Grindelia</i> sp.*					2				1	1
<i>Holocarpha macradenia**</i>										
<i>Hosackia gracilis</i>										
<i>Juncus buffonius</i>	2	5	2		2	2			2	
<i>Juncus patens</i>			2					5	4	
<i>Juncus phaeocephalus</i>				6					4	6
<i>Juncus tenuis</i>	2	5	2			5	2	8	2	1
<i>Lessingia filaginifolia</i>										
<i>Lilaea scilloides*</i>										
<i>Montia Fontana</i>										
<i>Nassella pulchra</i>										
<i>Perideridia gairdneri**</i>					5					
<i>Plagiobothrys diffusus**</i>	2									
<i>Ranunculus californicus</i>	2							4		2
<i>Rubus ursinus</i>								2	2	
<i>Sidalcea malvaeflora</i>	2				1	1				
<i>Sisyrinchium bellum</i>	4	4	2	6	6	6	6	2	2	4
<i>Vulpia microstachys</i>	2			2		2				
<i>Vulpia octoflora</i>										
<b>Subtotal Relative Cover (%) (Native Species)</b>	<b>58.0</b>	<b>59.0</b>	<b>55.0</b>	<b>60.0</b>	<b>54.0</b>	<b>58.0</b>	<b>56.0</b>	<b>57.0</b>	<b>53.0</b>	<b>54.0</b>

**Table 3. Belt Transects Relative Vegetative Cover by Species  
Revegetation Area, April 2012 Data (Belts 11 through 20) (Cont'd.)**

Scientific Name	Belt 11	Belt 12	Belt 13	Belt 14	Belt 15	Belt 16	Belt 17	Belt 18	Belt 19	Belt 20
<b>Non-Native Species</b>										
<i>Aira caryophyllea</i>					4		4	2	2	
<i>Anagallis arvensis</i>	1	2	1						2	
<i>Avena</i> spp.	2			2	2	3	1.5	4	2	2
<i>Briza maxima</i>	5	6	6	6	2	8	5	8	2	2
<i>Briza minor</i>			2	2	2		2	2	2	3
<i>Bromus diandrus</i>	1	1.5		2			1	2		2
<i>Bromus hordeaceus</i>	8	2	1		4	2	2	4	2	2
<i>Erodium</i> spp.		2	2		4	4			4	4
<i>Geranium dissectum</i>	4	2	5		2	2	4		2	4
<i>Holcus lanatus</i>		4	2	2				2		
<i>Hordeum jubatum</i>					3				2	
<i>Hypochoeris radicata</i>			5	2	4	2	2	2		2
<i>Lolium</i> spp.		2		2		4			4	
<i>Lythrum hyssopifolia</i>			4						3.5	
<i>Plantago lanceolata</i>	5		2	6	4	4	1	4		2
<i>Vicia</i> sp.	2					2	2			
<i>Rumex rosea</i>		2	2		4		2	2		
<i>Rumex acetosella</i>	6		2	2	2		2		4	6
<i>Soliva sessilis</i>										3
<i>Spergula arvensis</i>			4		4	2		4	3	2
<i>Stellaria media</i>				3.5						
<i>Trifolium dubium</i>	5	10	5	1	1	2	9	6	4	8
<i>Trifolium angustifolium</i>										
<i>Trifolium subterraneum</i>	2	6	2	8	2	5	5	2	6	2
<i>Vulpia myuros</i>	2	2		1	2	2	2		2	2
<b>Subtotal Relative Cover (%) (Non-Native Species)</b>	<b>42.0</b>	<b>41.5</b>	<b>45.0</b>	<b>39.5</b>	<b>46.0</b>	<b>42.0</b>	<b>44.5</b>	<b>43.0</b>	<b>46.5</b>	<b>46.0</b>
<b>Total Relative Cover (%) (All Species)</b>	<b>100.0</b>	<b>100.5</b>	<b>100.0</b>	<b>99.5</b>	<b>100.0</b>	<b>100.0</b>	<b>100.5</b>	<b>100.0</b>	<b>99.5</b>	<b>100.0</b>

\* = Locally Unique Species

\*\* = Special Status Species



**Native Vegetation Network**  
 653 Quail Drive • Santa Cruz, California 95060  
 Telephone/Fax (831) 425-0687

**Woods Cove Development  
 Mitigation Plan Work Program  
 Coastal Prairie Conservation  
 Easement Areas**

**Figure 1**  
 12/12  
 PV-104 HOA





Figure 3. Mowing in the Coastal Prairie Conservation Easement, fall 2012.



Figure 2. French broom removal in the Conservation Easement, spring 2012.



Figure 5. Planting native plants in the Revegetation Area, winter 2012.



Figure 4. Weed trimming non-native grasses in the Revegetation Area, spring 2012.



Figure 7. Gopher damage in the Revegetation Area.



Figure 6. Declining ponderosa pine in the Conservation Easement.