SAN BRUNO MOUNTAIN
HABITAT CONSERVATION PLAN

Year 2009 Vegetation Management Activities Report
For Endangered Species Permit PRT-2-9818

Submitted to
United States Fish and Wildlife Service

By

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DRAFT REPORT

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Report Prepared by:

West Coast Wildlands, Inc.
PO Box 1057
Pacifica, CA 94044
(650) 355-3589

Cover photos:
Top photo: View of Wax Myrtle Ravine, Dairy Ravine and Summit of San Bruno Mountain.
Left to Right: Callippe silverspot butterfly, Mission blue butterfly and San Bruno elfin butterfly.
Photos by: Patrick Kobernus, Coast Range Ecology.

VEGETATION MANAGEMENT AND RESTORATION

A. Invasive Species Control

The primary focus of habitat management activities on San Bruno Mountain since the inception of the San Bruno Mountain HCP in 1982 has been the control of invasive species infestations through hand removal, mechanical removal, and herbicide treatment. The methods and scale of activities have shifted over time, however the overarching goal of protecting and enhancing as much endangered species habitat as possible with available resources has remained unchanged. Habitat management activities conducted on San Bruno Mountain in 2009 were conducted in accordance with the goals, objectives and success criteria established in the San Bruno Mountain Habitat Management Plan 2009 (San Mateo County 2009). Priority areas for management of invasive species are delineated in the San Bruno Mountain HMP.

The majority of the habitat management activities conducted on San Bruno Mountain are performed by West Coast Wildlands, Inc., (WCW, Inc.) under contact to the Habitat Manager, San Mateo County Parks Department. In addition, other contractors such as Shelterbelt Builders and Restoration Resources, and numerous volunteers working for San Bruno Mountain Watch,CNPS and Heart of the Mountain, conducted invasive species control in 2009.

The infestations are prioritized because of the size of the Mountain habitat. The priorities are based on their threat to sensitive habitat areas, areas subject to invasive species control work (approximately 2,800 acres) and the expanding number of invasive species that require treatment are as follows:

Priority 1: Small patches of invasive species within native habitat
Priority 2: Small patches of invasive species at the periphery of native habitat
Priority 3: Edges of large invasive species infestations
Priority 4: Large invasive species infestations

Herbicide and hand removal are the main methods to control the invasive plants. The target species treated with an herbicide solution containing either Garlon 4 Ultra® (triclopyr ester) or Aquamaster® (glyphosate). These herbicides are used due to their high effectiveness, low toxicity rating and short half-life in the soil. Garlon 4Ultra® herbicide is the preferred chemical since it does not harm monocots (grasses). Herbicide is applied one to four times per year in suitable weather (low wind, low humidity) for maximum plant uptake. The plants are left to decay in place, a process that takes from one to five years depending upon the size of the plants. In sensitive areas (near butterfly habitat and within 150 feet of private property) mature stands of invasive plants are removed by hand control, chainsaw or mowing followed by stump herbicide treatment.

1. 2009 HCP Invasive Plant Treatment Summary

The primary focus of non-native species control is on invasive shrubs and herbaceous species that pose the greatest threat of displacing butterfly habitat and other native habitats. Invasive plants that were treated aggressively in 2009 include gorse (*Ulex europaeus*), French broom (*Genista monspessulana*), Portuguese broom (*Cytisus striatus*), cotoneaster (*Cotoneaster ssp.*), eucalyptus (*Eucalyptus globulus*), fennel (*Foeniculum vulgare*), radish (*Raphanus ssp.*), field mustard (*Hirsch feldia incana*), Himalayan blackberry (*Rubus armeniacus*), jubata grass (*Cortaderia jubata*) and Oxalis (*Oxalis pes-caprae*). A growing amount of attention is also being paid to weeds that are not as pervasive as those listed above, but that are capable of altering community composition through competition within their microhabitat. These include species such as red valerian (*Centranthus ruber*), panic veldtgrass (*Ehrharta erecta*), and pin-cushion plant (*Scabiosa atropurpurea*).

Fennel is treated as one of the highest priority weeds on the Mountain and populations have been significantly decreased in some locations, such as on the slope above Hillside School. However, a high level of follow-up maintenance is required for management of fennel. Stands may require several treatments a year for many years before the plant is eradicated. Hence, significant resources are required for continued treatment of a site, thus limiting the total area that can be adequately treated.

In 2009, 745 acres of invasive plants were treated by hand or with herbicides (Figure 1). Many of these acres were treated 2 to 3 times for repeat control of various species. West Coast Wildlands maintains daily record sheets for all invasive species work conducted on the Mountain. This includes a 300 acre wildland burn on San Bruno Mountain in June of 2008 that covered Owl and Buckeye Canyons as well as part of the East Ridge Trail and the addition of 185 acres deeded to San Mateo County Parks Department in 2008 . The Owl and Buckeye Cyn burned mostly coastal scrub and the coastal grassland burn was south of the Ridge Trail East. These areas are considered prime habitat for the Mission Blue and Callippe Silverspot Butterflies as are the deeded properties.

The greatest efforts went into treating invasive species within key butterfly habitat areas on the South slope, Northeast Ridge, Owl and Buckeye Canyons, the Saddle, Juncus Ravine, the Ridge Trail, Pointe Pacific, the Hill West of Quarry, West Peak, and Wax Myrtle Ravine. In addition, roadside and trailside areas along Radio Road, Old Ranch Road and Guadalupe Canyon Parkway were treated due to the high rate of recurring weed invasions of these disturbed areas (Figure 1). Two new sites were added to this years scope that included Ice House Hill (Callippe Silverspot habitat) and Preservation Parcel (Ohlone Indian archeological site and wetland habitat) both located at the eastern section of the Park.

The following invasive plant species were treated in 2009:

Table 1. Invasive Species treated on San Bruno Mountain by West Coast Wildlands in 2009.

Acacia sp. (acacia)	*Euphorbia lathyris* (Caper spurge)
Carduus pycnocephalus (Italian thistle)	*Foeniculum vulgare* (fennel)
Carpobrotus edulis (hottentot fig, iceplant)	*Genista monspessulana* (French broom)
Centaurea melitensis (Napa thistle)	*Hirsch feldia incana* (mustard)
Conium maculatum (poison hemlock)	*Lactuca virosa* (wild lettuce)
Cortaderia jubata (pampas grass)	*Leucanthemum vulgare* (ox-eye daisy)
Cotoneaster sp. (cotoneaster)	*Oxalis pes-caprae* (Bermuda buttercup)
Cupressus macrocarpa (Monterey cypress)	*Pinus radiata* (Monterey pine)
Cytisus scoparius (Scotch Broom)	*Picris echioides* (bristly ox-tongue)
Cytisus striatus (Portuguese broom)	*Raphanus ssp.* (radish)
Delairea odorata (Cape ivy)	*Rubus armeniacus* (Himalayan blackberry)
Echium candicans (Pride of Madera)	*Silybum marianum* (milk thistle)
Eucalyptus globulus (blue gum tree)	*Ulex europaeus* (gorse)

Figure 1:

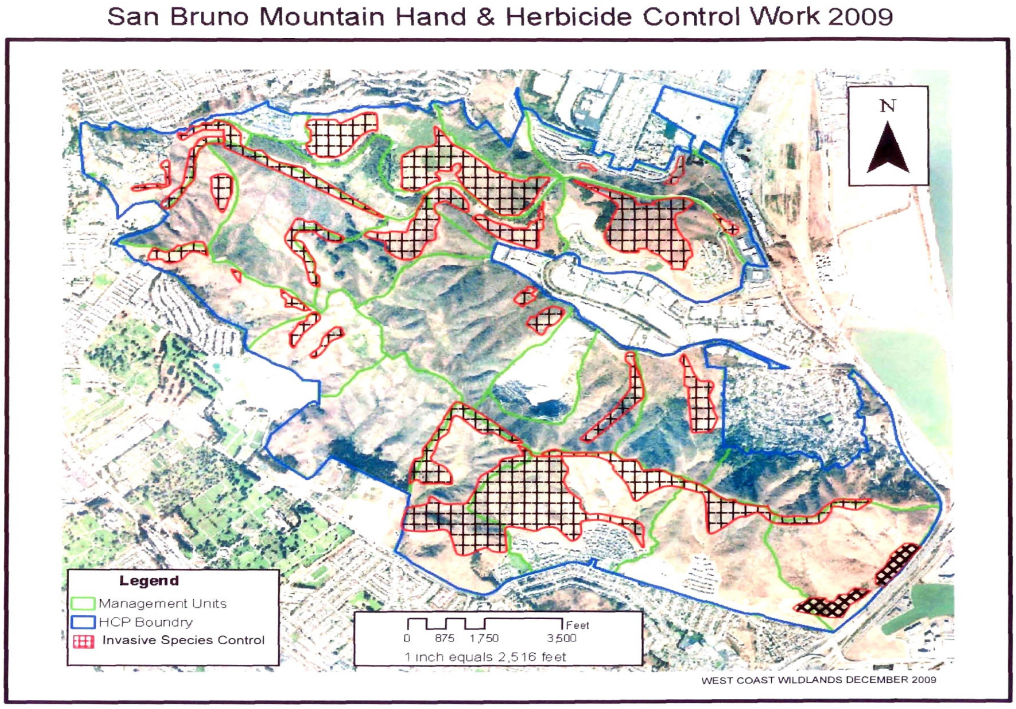


Table 1 includes species that were recorded on WCW daily record sheets. However, additional species that were not the focus of a particular day's control effort are occasionally treated by WCW and are not recorded. This is especially true when only a few individuals or a small patch are hand removed this minor amount of work doesn't warrant creating an additional data sheet. Additional invasive species are occasionally targeted by volunteer groups during volunteer weeding days. These species are shown in Table 2.

Table 2. Additional Invasive Species treated on San Bruno Mountain in 2009 by Shelterbelt Builders and volunteer groups.

Avena spp. (wild oat)	*Hypochaeris radicata* (hairy cat's ear)
Briza maxima (quaking grass)	*Lactuca serriola* (prickly lettuce)
Bromus hordeaceus (soft chess)	*Lobularia maritima* (Lobularia)
Centaurea calcitrapa (purple star thistle)	*Lolium multiflorum* (Italian wild rye)
Centranthus ruber (red valerian)	*Lythrum salicaria* (purple loosestrife)
Chenopodium album (lamb's quarter)	*Myoporum laetum* (Myoporum)
Cirsium vulgare (bull thistle)	*Phalaris stenoptera* (harding grass)
Digitalis sp. (fox-glove)	*Plantago lanceolata* (plantain)
Ehrharta erecta (panic veldtg rass)	*Pyrocantha crenato-serrata* (pyrocantha)
Erechtites arguta (New Zealand fireweed)	*Rumex crispus* (curly dock)
Erodium cicutarium (filaree)	*Rubus armeniacus* (Himalaya blackberry)
Hedera helix (English ivy)	*Rumex acetosella* (sheep sorrel)
Helichrysum petiolare (licorice plant)	*Scabiosa atropurpurea* (pin-cushion plant)
Holcus lanatus (velvet grass)	*Solanum* ssp. (nightshade)

The two new weed species found in 2007, yellow star thistle (YST) on the Mountain (*Centauria solstitialis*) along Radio Road, and gopher spurge (*Euphorbia lathyrus*) in Pointe Pacific were treated and only the spurge is still emerging from seeds. The gopher spurge covered an area of approximately 1000 sq. ft (at approximately 1 % density) and was treated twice with 2% Garlon in the spring of 2009. A few YST plants have returned along the Guadalupe Canyon roadside and were treated.

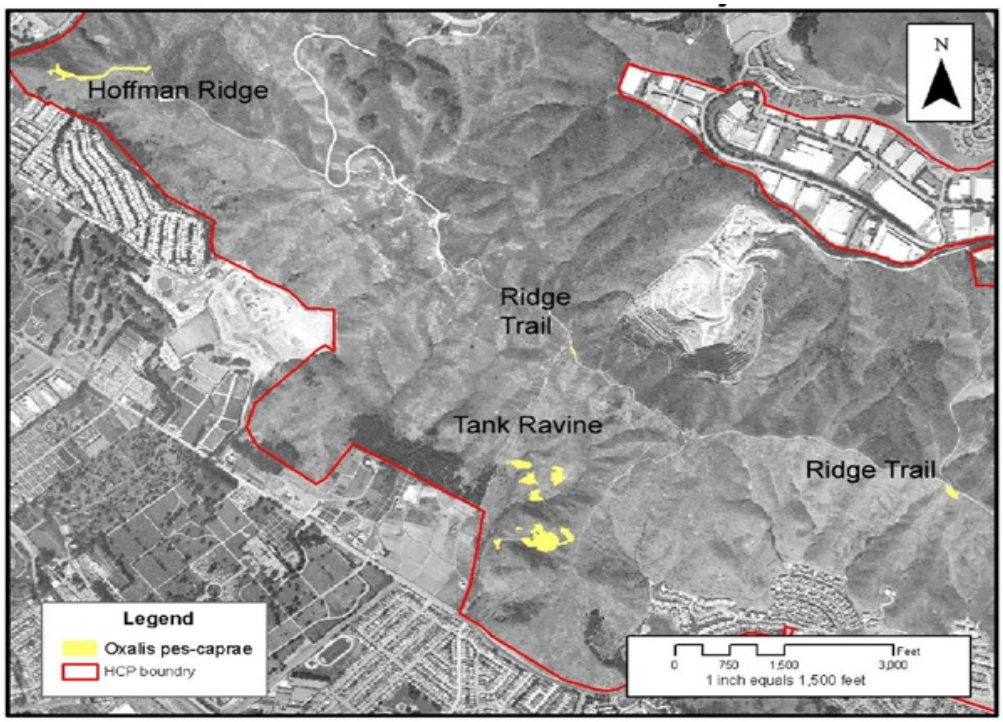
In 2009, emphasis will continue to be placed on those areas and weeds that pose the greatest threat to grassland butterfly habitat, and in areas that have been receiving previous efforts. Only with continued follow-up treatment and maintenance can an invasive infestation be managed. However, when small populations or isolated individual species of concern are discovered in an area where they had previously not seen or treated, they are noted and WCW either diverts funds to treat these if possible, or the plants are monitored and identified for control in the following year's budget. In addition, recommendations made by the Technical Advisory Committee that meets quarterly (section IV. B below) will help guide weed control efforts. Preventing the establishment of new highly invasive weeds such as YST on the Mountain should be the highest priority.

2. HCP Oxalis Control Project

As part of the 2005/2006 HCP fiscal year budget, special funding was approved for aggressive control of Oxalis (*Oxalis pes-caprae*). Oxalis has been proliferating on the Mountain and is of concern as it can form dense mats and out compete native plant species for light and space . Oxalis has also been found to inhibit the germination of some native plants (Brooks 2001). On San Bruno Mountain, the greatest concentration of Oxalis is found in the Poison Oak Ravine and Hillside management areas (which includes the Tank Ravine management area).

Oxalis is also found along the Ridge Trail growing under scrub vegetation, and along a ridge trail from the Ranger's Station to nearby the terminus of Hoffman Street (Daly City). Other, smaller infestations (Dairy Ravine, Radio Road, and below Brisbane Water Tank) are already treated as part of the general budget and work plan.

Figure 2: SBM Oxalis Treatment



The funding for Oxalis control was approved for 2009/2010 fiscal year by the HCP Trustees and applied to follow-up treatment of the original control sites with some expansion of the mapped infestation (Figure 2). The new sites observed downslope of the Ridge Trail east of Juncus Ravine, Hillside, Upper Tank Ravine and above Pacifica Nursery located on Hillside Dr, Daly City and Mandalay Point, So. San Francisco.

A total of approximately 52 acres have been treated thus far since inception of the project in 2005. An assessment made by WCW in late 2009 detected a kill rate ranging from 75 to 90%. Some of the areas that have been controlled of Oxalis have been colonized by coyote brush and wild oat.

3. Owl and Buckeye Canyons Wildland Burn Site June 2009

West Coast Wildlands, Inc. placed 5 photo stations (Figure 3) within the burn site to monitor the regeneration of native and non-native plants. Each monitoring station is visited every 6-8 weeks. There are two Buckeye Canyon photo stations along west of Army Road, facing west, two photo stations overlooking Owl Canyon and one along Ridge Trail East.

Figure 3 Owl & Buckeye Canyon Burn site June 2008

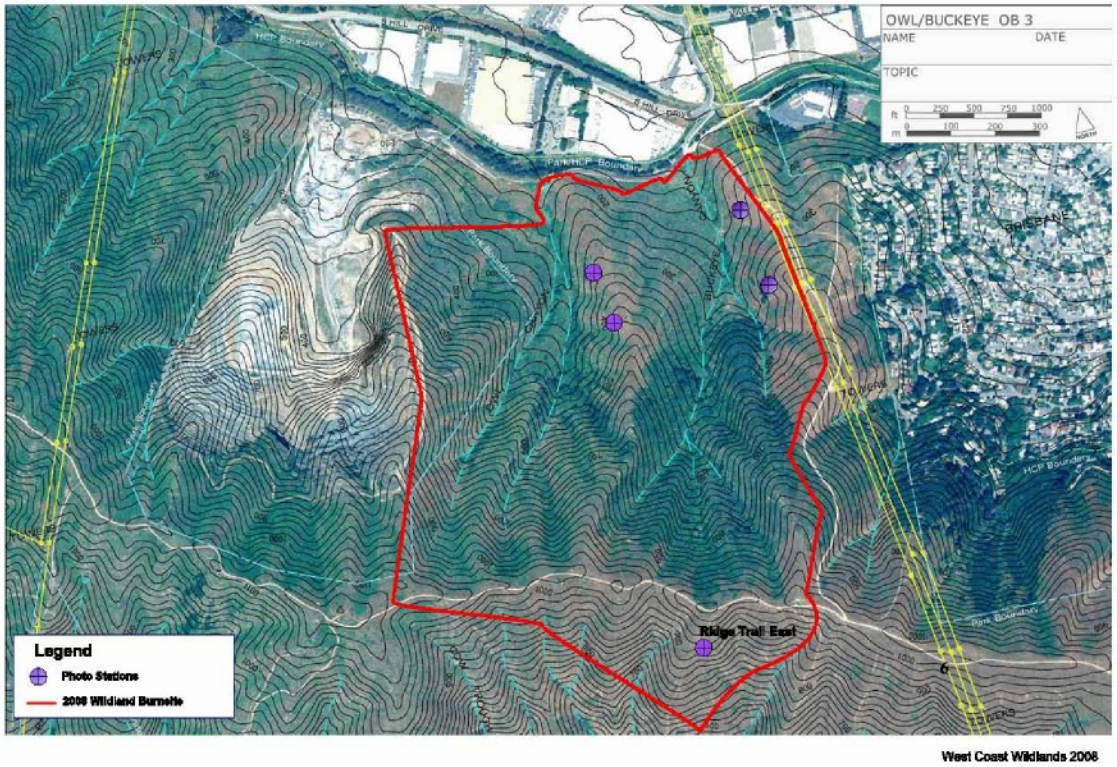


Figure 4: San Bruno Mountain Watch Working Aerial Map

West Coast Wildlands, Inc., has added additional efforts to the 2009 HCP Exotics Control budget to reduce the Coyote brush (*B. pilularis*) that has been gradually displacing the native perennial grassland habitat along Owl and Buckeye Canyons. Two methods are used to reduce the brush; 1) Cut stump treatment at the base of the larger (> 2 in DBH) brush removed by chainsaws (Photo 1) and 2) Foliar application to secondary growth on smaller plants (<2 in. DBH). This is a group effort between the HCP Maintenance program working the upper one-third of the ridge lines where the butterfly habitat is prevalent and San Bruno Mountain Watch (SBMW), a non-profit stewardship program, using hand tools to removing weedy plants in the burn zone (Figure4)

B. Invasive Species Control Work (not funded by the HCP)

Several supplemental invasive species control projects are currently being implemented on San Bruno Mountain in addition to the work funded through the HCP. Some of these projects are very large in scope, and have resulted in a significant reduction in invasive weeds.

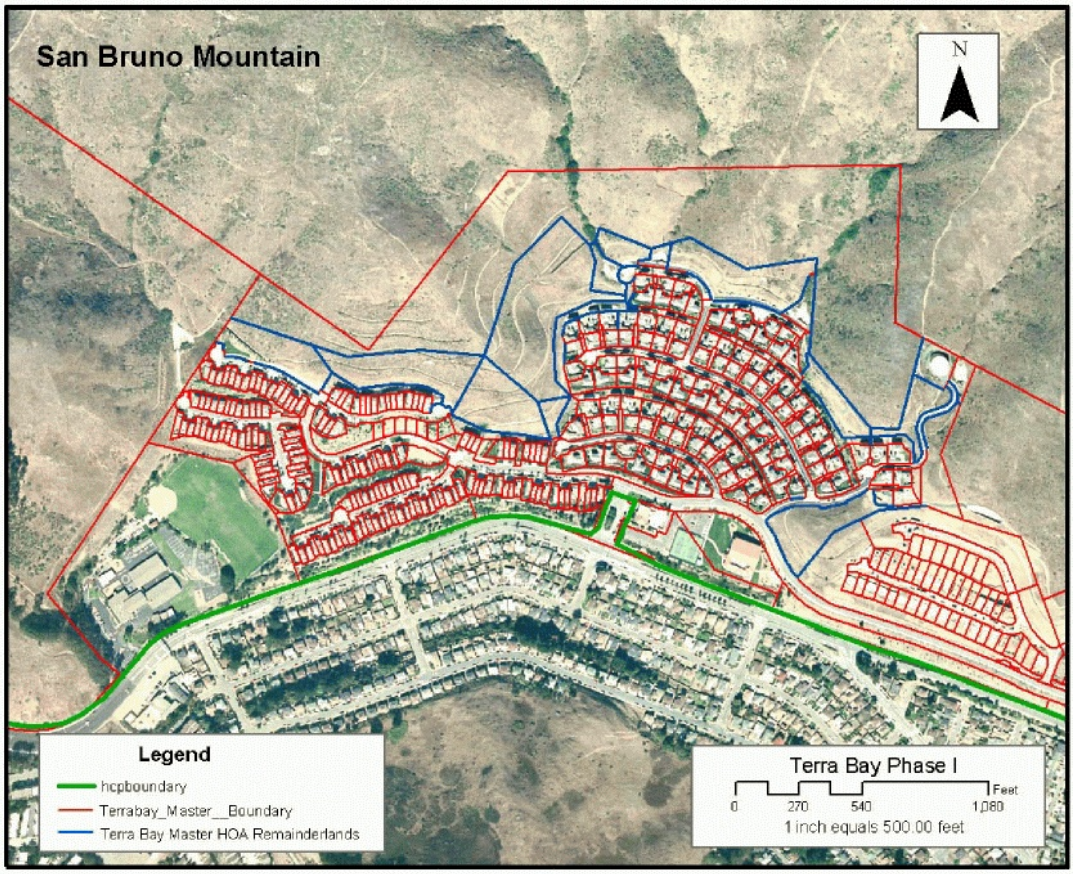
Terra Bay Master Homeowners Association Invasives Control Project

1.

The Terra Bay Master Homeowners Association (TBMHOA) was deeded the Remainder lands in 2006 (Figure 4: Terra_Bay_Master) and are within the HCP boundary. There are 11 parcels totaling approximately 25 acres bordering the TBMHOA property, with San Bruno Mountain parkland located on the western, southern and eastern boundaries. The TBMHOA accepted an Exotics Control Plan by West Coast Wildlands to treat invasive weed species for a period of three and one-half years beginning in the fall of 2008 and ending in the Spring 2010. The listed weed species are Bristly Ox-tongue (Picris echioides), Fennel (Foeniculum vulgare), F. Broom (Genista monspessulana), Mustard (Hirsch feldia incana), Bermuda buttercup (Oxalis pes-caprae), Jubata grass (Cortaderia jubata) and radish (Raphanus ssp).

The 11 parcels were mowed during a three-week period in the Spring and Fall 2009 removing dead material to expose weedy root stems and initiate secondary growth for herbicide treatment. Weed species within 24 inches of mission blue and/or Callippe silverspot host and nectar plants were removed using hand tools with little disturbance to the soil. The Jubata grass was treated with 2% Aquamaster herbicide. The Winter mow of annual and perennial weed species are treated with herbicides in early spring to late Summer 2009. There was a 95% reduction of mature Fennel and 100% reduction of mature Jubata grass.

Figure 5 Terrabay Village & Park Master HOA Parcel Map



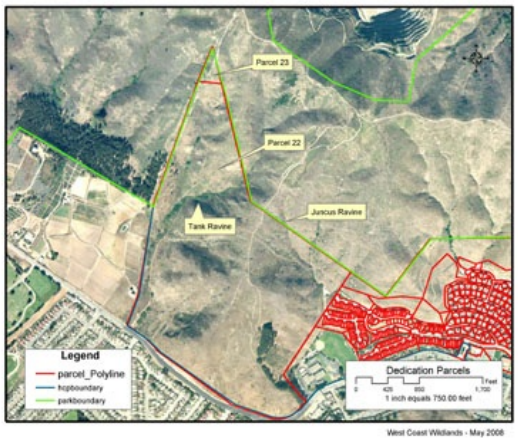
West Coast Wildlands - December 2007

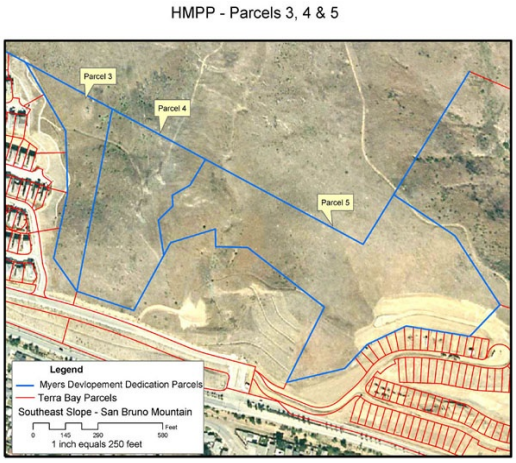
2. Myers Peninsula Partners, Inc., Dedication Parcels Exotics Control Project

In June 2008, Myers Peninsula Partners, Inc., hired West Coast Wildlands, Inc. to write a 5 year Exotics Control Plan and a contract was approved with WCW in October 2008 to the treat primary weed species on five parcels that potentially will be dedicated to San Mateo County Parks Department. The areas consist of 185 total acres (Figure 6: Parcels 3, 4, 5 22 & 23) and would be the largest dedication of land to the County Parks Department. These sites were previously treated for weeds on a regular basis from 2001-2005 by Myers Peninsula Partners, Inc.

The main weed species WCW treated are Fennel (*Foeniculum vulgare*), mustard (*Hirsch feldia incana*), W. radish (*Raphanus ssp*), F. broom (*Genista monspessulana*), P. grass (*Cortaderia jubata*) and Bermuda buttercup (*Oxalis pes-caprae*). The methods applied are hand control with Polaski, Machette and brush cutters and herbicide control using basal bark, foliar and thin line. The current status of effort is a 85-90% reduction of the mature primary weed species. This initial treatment continued through the Spring 2009.

Figure 6: Myers Peninsula Partners Inc., Dedication Parcels





Tank/Juncus Ravine Parcels 22 & 23 South Slope Parcels 3, 4, & 5

3. San Bruno Mountain Watch Exotics Control Project (SBMW)

SBMW volunteers visited Buckeye and Owl Canyon, or in the Brisbane Acres with 10-20 people 3-4 times in 2009 doing stewardship on the mountain. They concentrated on removing invasives, doing no planting. Species removed were primarily scabiosa, Italian thistle, hemlock, broom, fennel, mustard, radish, bristly ox tongue, and velvet grass near the June 2008 burn site.

SBMW hired WCW to treat the blackberry, P hemlock and Harding grass at the base of the canyons. The two working methods were mowing and herbicides 2 times over 2 months to improve the native perennial grassland and Mission blue butterfly habitat (See Figure 4).

C. Restoration of Habitat

For purposes of clarity, the term “restoration” is used to refer to areas planted and/or reseeded with native plant species. Restoration sites also receive invasive species control through the use of herbicide, mowing, hand weeding and/or other tools to maintain the planted areas. As areas that are restored will generally require ongoing maintenance, “restored” is understood to mean that the goals and objectives of the restoration project were met, regardless if ongoing maintenance will be required. Restoration is a measurement used by the County of San Mateo for their Outcome Based Management.

Early attempts at large scale restoration on disturbed slopes on San Bruno Mountain were largely unsuccessful due to the difficulty in maintaining areas against a large influx of weeds. As a result, a strategy of creating small habitat islands (up to approximately 1/2 acre in size) was developed.

Since 1997 this approach has been implemented in several areas of the Mountain and has proven to be successful in Eucalyptus cut areas, former gorse patches, and on graded slopes disturbed by development. Maintaining these sites over time requires ongoing management to control invasive species and brush succession. The primary goal of the restoration work has been to establish habitat for the endangered mission blue (MB) and callippe silverspot (CS) butterflies.

It should be noted that the Mission blue's host plants (lupines) are often patchy in their distribution, and will colonize disturbed roadcuts, landslides, and trails. Mission blues utilize these patches, and can easily move between patches that are 100 meters apart (Arnold 1983), and have been recorded moving distances up to 0.25 miles (TRA 1981) between habitat patches. In contrast, CS utilize much larger areas of habitat due to their larger size and stronger flying ability. Callippes can move several hundred feet within less than a minute when traveling across terrain searching for Viola and appropriate hilltopping habitat (San Bruno Mountain Habitat Management Plan 2009), and can likely travel as far as 0.75 miles between habitat patches ((TRA, 1981). The CS host plant, *Viola pedunculata*, typically occurs in much larger, denser patches than lupines do, though Viola can also on occasion be found in small patches and in disturbed areas.
Growing and establishing Viola within restoration sites has been largely unsuccessful to date, however experimentation has continued on a small scale. Because the Callippe's habitat is typically found in much larger patches, and it is these patches that support the population on San Bruno Mountain, it is more important at this time to direct efforts into protecting the conserved grassland habitat that contains Viola than to direct significant funds into replanting Viola within restoration areas.

Though restoration is important, the first priority should always be protecting the existing habitat, because that is the best use of funds for ensuring the long-term survival of both MB and CS on San Bruno Mountain (Biological Program, HCP Volume I, 1982). This management approach has been in use since the inception of the HCP and the effectiveness of this approach has been documented in previous annual reports and is demonstrated through the continued persistence of the endangered species on San Bruno Mountain. It is imperative that this approach be continued in the future to manage the endangered species effectively.

1. Restoration Guidelines for Mission Blue and Callippe Silverspot Butterflies

HCP funded restoration work in the form of weed control, erosion control and planting has been ongoing on the mountain since the mid-1980's. The primary goal of the restoration work is the establishment of high quality habitat for the MB and CS butterflies. Because the HCP does not specify what is required for successful restoration, (i.e. number of host plants established, percent cover of natives, etc.) *The Habitat Restoration Guidelines for MB and CS* (TRA, November 2000) provide guidelines for restoring suitable MB and CS butterfly habitat, and assist restoration professionals with accomplishing the habitat goals of the HCP.

The guidelines include suggested methods on how to select appropriate restoration sites, recommendations on host plant densities to support the endangered butterflies, and host and nectar plant propagation methods.

They are to be used in conjunction with the *Standards for Acceptance of any Dedicated Lands by the County of San Mateo in Accordance with the San Bruno Mountain Area Habitat Conservation Plan*, prepared by the San Mateo County Parks Department.

2. HCP Habitat Islands

Since 1995, several habitat restoration islands have been created and managed within former eucalyptus and gorse sites within the HCP conservation area by Shelterbelt Builders. Inc. They are maintaining the exotics within those sites on an annual to bi-annual basis and deemed suitable for endangered butterfly habitat enhancement. Work conducted in 2009 on the habitat islands is being applied to those islands that have shown the best results in thriving and little maintenance required. The Planting islands are Colma Creek (CC1) dairy Ravine (D1 & D5), N.E. Ridge Burns Sites (NER1 & 2) and N.E. Ridge Planting island (NERPI 3-6, 7a & 7b).

3. The Watershed Project / Heart of the Mountain

Under a State Parks Grant managed by the County of San Mateo, the Watershed Project is carrying out “Heart of the Mountain” directed by Joe Canon. The goal of Heart of the Mountain is to restore the Colma Creek headwaters to a native riparian plant community. The Heart of the Mountain project leads volunteer groups in weed removal and native planting. Priority invasive plants for removal include Cape ivy (*Delairea oderata*), English ivy (*Hedera helix*), Himalayan blackberry, and eucalyptus. An additional 250 plants native to the Bog habitat were planted in January and February 2009

4. Habitat Restoration Work on Development Slopes

Myers Development Company created habitat restoration sites on private properties within the HCP located at Mandalay point. Perennial grasses and butterfly host and nectar plants native to San Bruno Mountain were planted in the Office and Buffer Parcels.

D. Grazing and Burning

No grazing or burning projects were conducted on San Bruno Mountain in 2009. Burning and grazing are identified as important habitat management tools in the San Bruno Mountain HCP and the San Bruno Mountain Habitat Management Plan, 2009. A Control Burning project as part of the Vegetative Management Plan (VMP) being formulated by the Habitat Manager and is proposed for implementation within the County Park in the near future.

1. References

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All San Bruno Mountain HCP documents/ resources available on-line at http://www.traenviro.com/sanbruno/ or from County of San Mateo Parks Department.