# PROTUGUESE BEND RESERVE FIRE RECOVERY PLAN

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## **SECTION I - OVERVIEW AND EXISITNG CONDITIONS**

## I.I INTRODUCTION

The August 27, 2009 Palos Verdes Fire burned approximately 180-acres in the cities of Rancho Palos Verdes and Rolling Hills. The fire began, in and was centered within, the 399-acre Portuguese Bend Reserve (Reserve). The Reserve is the largest of the ten reserves that make up the Palos Verdes Nature Preserve (PVNP). As well as providing community-valued recreation, the Reserve contains important linkages for wildlife and valuable native habitat for sensitive species. The wildfire burned approximately 165-acres within the Reserve, affecting both native and non-native vegetation and known nesting sites of the threatened coastal California gnatcatcher (*Polioptila californica californica*) and the special status cactus wren (*Campylorhynchus brunneicapillus*).

This report addresses the management and recovery of habitat and trails in the fire-affected area of the Portuguese Bend Reserve. The recommendations in the report are based on the management of the PVNP under a draft Natural Community Conservation Plan to "maximize benefits to wildlife and vegetation communities while accommodating appropriate economic development within the City of Rancho Palos Verdes." Under the plan, the Palos Verdes Peninsula Land Conservancy (PVPLC) serves as the habitat management agency for the PVNP, for the land owners (the City of Rancho Palos Verdes). This report does not offer post-fire recommendations for public safety, enforcement or other responsibilities outside of the scope of habitat management.

This section of the fire recovery plan documents existing, pre-fire conditions and management of the Reserve. Section 2 provides restoration and monitoring specifics. Section 3 defines research opportunities and public resources are shown in Section 4.

#### 1.2 COLLABORATIVE MANAGEMENT

The PVPLC is a 501(c)(3) nonprofit organization. PVPLC works cooperatively with cities, property owners and environmental groups, locating funds for purchasing land, providing tax benefits for land donation, restoring habitat, and promoting the conservation of natural open space. PVPLC manages the PVNP under an operating agreement with the City of Rancho Palos Verdes.

#### 1.3 PRE-FIRE CONDITIONS

The 399-acre Reserve is comprised steep canyons, rolling hills and rock outcrops sloping towards the Pacific Ocean. The site is bounded on the west and north by open space and residential homes, and the east by Forrestal Reserve and residential homes within the City of Rolling Hills. The southern section of Reserve ends at Palos Verdes Drive South, in the Portuguese Bend Landslide area.

In the spring of 2009, vegetation mapping using California Native Plant Society's Rapid Vegetation Assessment Protocol was completed. This information accurately describes the Reserve's pre-fire habitat types with both native and non-native vegetation stand (see Figure 1).

In the Reserve's two main canyons, Portuguese and Paintbrush, lemonadeberry (*Rhus integrifolia*) is the dominant vegetation type. Other native vegetation communities found within pre-fire Portuguese Bend Reserve are prickly pear cactus (*Opuntia littoralis*), buckwheat species (*Eriogonum cinereum* and *E. fasciculatum*), California sagebrush (*Artemisia californica*), and coyote bush (*Baccharis pilularis*). For a complete list please see Table 1.

The dominant non-native species within the grassland community of the Reserve are wild oats (Avena fatua), black mustard (Brassica nigra), short pod mustard (Hirschfeldia incana), and sweet fennel (Foeniculum vulgare). Non-native tree stands were also present along the main trails and hilltops. Non-native acacia (Acacia cyclops), eucalyptus and pine species are also dominant in the pre-fire vegetation communities of the Reserve.

**TABLE 1: Pre-fire vegetation types and associated acreages** 

PORTUGUESE BEND RESERVE PRE-FIRE VEGETATION TYPE WITH ASSOCIATED ACERAGES			
Vegetation Type	Acres		
Acacia cyclops	1.9		
Acacia cyclops-Rhus integrifolia	8.5		
Artemisia californica			
Brassica nigra			
Brassica nigra-Rhus integrifolia			
Brassica nigra- Rhus integrifolia-Acacia cyclops			
Baccharis pilularis			
Baccharis pilularis-Foeniculum vulgare			
Eriogonum cinereum			
Eriogonum cinereum-Salvia melifera			
Eriogonum fasciculatum			
Eucalyptus species			
Foeniculum vulgare			
Heteromeles arbutifolia			
Hazardia squarrosa			
Isocoma menziesii			
Non-native grasses			
Opuntia littoralis			
Pinus species			
Rhus integrifolia			
Rhus integrifolia-Brassica nigra			
Salvia leucophylla			
Schinus species			
Total	165.7		

Portuguese Bend Reserve Reserve Boundary Fire Boundary Pre-fire Vegetation Map Aac - Acacia cyclops Ac - Artemisia californica Bn - Brassica nigra Bp - Baccharis pilularis Ec - Eriogonum cinereum Ef - Eriogonum fasciculatum Esp - Eucalyptus species Fv - Foeniculum vulgare Ha - Heteromeles arbutifolia Hs - Hazardia squarrossa lm - Isocoma menziesii Lc - Leymus condensatus NNG NNG - non native grasses OI - Opuntia littoralis Psp - Pinus species Bn Ri - Rhus integrifolia SI - Salvia leucophylla Sm - Salvia mellifera Ssp - Schinus species Bp Psp Bn Bp-F Bn Aac-Ri Ri

FIGURE 1: Pre-fire vegetation map of Portuguese Bend Reserve

Aac-Ri

Ri-Bn

Bn-Ri

Bn-Ri-Aac

#### 1.4 FIRE HISTORY

Two documented fires occurred within the Reserve in the last half century: the 929-acre Crenshaw Fire, which started on June 22, 1973 and the 2005, 179-acre, San Clemente Fire. Both fires overlapped into the burn area for the 2009 Palos Verdes Fire.

## **SECTION 2 – RESTORATION AND MONITORING SPECIFICS**

#### 2.1 EROSION AND TRAILS

Increased surface erosion of hillsides, canyons and trails is expected in the burn area until the area stabilizes, especially during storm events. Stabilization of the area will come over time but permanent native vegetation is the best long-term solution for soil stabilization and erosion control. Some targeted replanting of mature native vegetation in combination with native seeding is a possible method to counteract erosion and mudflow. However, it is important to understand that soil movement and erosion are natural occurrences in a post-fire environment.

Other erosion control strategies are engineered, as opposed to re-vegetation, but achieve a similar outcome of slowing the flow of water, protecting the surfaces from erosion and controlling sediment flows. One strategy is to use retention basins, which serve multiple purposed, including sediment and erosion control. They act as flood control devices which slow down the flow, and retain the storm water to prevent flooding downstream. They also act as water quality best management practices by allowing storm water infiltration, groundwater recharge, and by allowing sediment to settle out of the water before it flows further downstream. Other erosion control strategies include using rock to slow water flow, vegetated swales for sediment control, berms and diversion terracing to redirect or slow water flow, geofabric netting to contain loose soil and sediment, soil stabilizers to harden areas of loose soil on trails; and temporary measures such as fiber roles, straw bales, and silt fences. It is important to note that the use of imported physical barriers, such as mulch or hay bales, may contain non-native seeds and should be researched thoroughly before importing into the Reserve.

These engineered erosion control options may be applicable in some sections of the burn area, but will be used judicially to control localized erosion in the canyons and along trails. Based on a complete Burn Area Report authored by the Los Angeles County Department of Public Works, addressing the potential sediment impacts created by the 2009 Palos Verdes Fire (see Resources section), increased sediment deposition is expected in the three main canyons of the burn area. The City of Rancho Palos Verdes is currently working with specialists and engineers to determine the best and most appropriate plan to protect against mudslides and erosion in the areas highlighted in the Burn Area Report.

It is recommended that erosion control efforts in the Reserve be focused on the re-vegetation of native plants. Limited, temporary erosion control measures, guided by best management practices, are also recommended in areas where excessive soil loss may compromise the

stability of trails, banks or canyons, or have the potential to negatively affect downstream commodities such as culverts or storm drain outlet structures. It is most likely that these erosion control strategies may be implemented on an as needed basis, depending on storm frequency and rain event.

It is also recommended that the trail system within the burn area be managed for potential areas of erosion and instability, and closure of unauthorized trails to limit disturbance of sensitive habitat. The following trail recommendations are proposed:

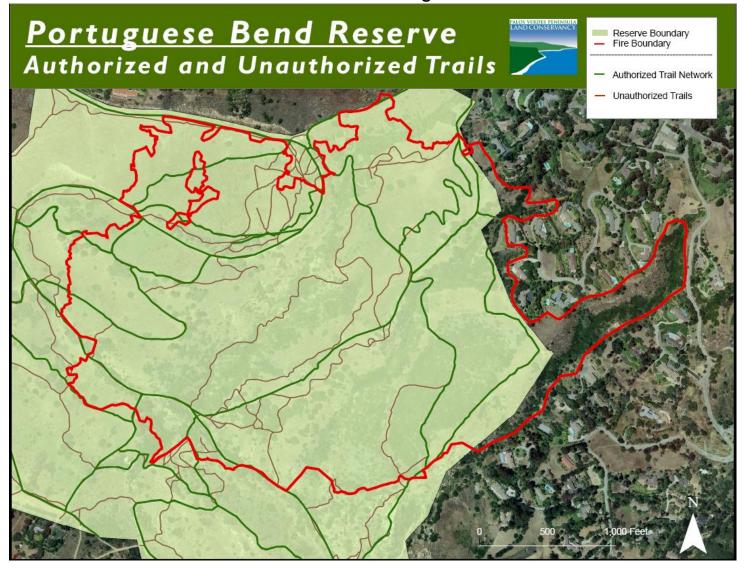
# I. Trail Realignment:

- Realign (Toyon, Fire Station, Rim) of trails within the wildfire burn area to allow for better user access, long-term trail sustainability and reduced native habitat disturbance
- Restore areas disturbed by trail realignment and associated trail closure with Peninsula native plants and seed and install appropriate informational signs to reroute user groups.

#### 2. Trail Enhancement:

- Enhance authorized trails in 200 acres burn area
- Enhance authorized trails outside of burn area
- Enhance authorized trail system by limiting social trail network using trail closures along with planting native plants and seeds.

FIGURE 2: Authorized and unauthorized trails in Portuguese Bend Reserve.



#### 2.2 INVASIVE SPECIES CONTROL

Successful recovery of the Reserve burn area is dependent on the establishment of native plants. For this to occur, an aggressive invasive species control program must be implemented within the burn area. Soil seed bank composition, competing native vegetation, soil disturbance and fertility, fire severity, and climatic regime and weather all affect a community's susceptibility to invasion after fire. Pre-fire vegetation data suggests 65% cover of non-native species in the burn area (Table I). Similarly, pre-fire native vegetation stands are equally exposed to post-fire invasion in the Reserve as they are patches in a matrix of dominant non-native weeds (see Figure I). Mitigating species invasions following a fire with active intervention of herbicides or other treatments designed to control or eliminate the invasion is recommended.

It is recommended that invasive species be targeted throughout the burn area. A dual approach to weed control is suggested: I) targeting all non-native species within known stands of pre-fire dominant native vegetation (Figure 2), and 2) targeting non-native species based on invasiveness throughout the entire burn area. Species priority will be based on PVPLC's Targeted Exotic Removal Plant Program guidelines, which use a synthesized rating system drawn from plant invasiveness rankings from both the California Invasive Plant Council and the California Department of Food and Agriculture. Removal methodologies will include, but are not limited to: herbicide, hand removal, mechanical weeding.

In addition to direct control on invasive species, indirect measures to control spread should be implemented. It is recommended to limit the exposure of bare ground and any damage that may come from trampling. Soil disturbance derived from off-trail use of the Reserve must be limited. Off-trail and unauthorized trail usage results in trampling of native seedlings and soil disturbance which encourages fast growing non-native plants. Along with Reserve rule enforcement, this can be achieved through education signage at key locations within the Reserve and trail signs designating official trails, areas closed for restoration, and directional signs pointing away from unauthorized and closed trails.

## 2.3 HABITAT RESTORATION AND ENHANCEMENT

The purpose of this habitat restoration is to establish ecologically appropriate native habitats in areas disturbed by fire and to enhance the ecological functions of the adjacent native habitats within the Reserve. The following general goals were determined for the habitat restoration after evaluating the post-fire conditions of the Reserve:

### Primary Goal

Increase successful native plant species diversity and structural diversity of the site by restoring native cactus scrub and coastal sage scrub habitats.

#### Additional Goals

Establish native habitats that will be self-sustaining in the long-term by encouraging conditions that will allow natural processes to proceed, including soil development, nutrient cycling, plant succession, natural regeneration, and resistance to perturbation.

Figure 3 references the recommended areas and methodologies for habitat restoration in the burn site. As previously described, the goals of restoration are to increase the success of native plant establishment by limiting completion from non-native weeds and ensuring natural regeneration. This approach to restoration would be two-fold, through: I) weed control throughout the site; 2) supplemental native seed distribution and mature species planting.

It is assumed that all areas within the burn site are susceptible to non-native plant invasion. Weed control will be required to thin or remove mainly annual grasses, exotic mustards, fennel and acacia. Priority will be based on PVPLC's NCCP Targeted Exotic Removal Plant Program guidelines, which use a synthesized rating system drawn from plant invasiveness rankings from both the California Invasive Plant Council and the California Department of Food and Agriculture. Removal methodologies will include, but are not limited to: herbicide, hand removal, mechanical weeding. Only herbicides registered for use in wildlands would be used judiciously in the Reserve.

In pre-fire stands of cactus scrub and coastal sage scrub (Figure 3) historically occupied by covered species, it is recommended that mature container plants be planted to speed up the recovery and increase potential habitat. Container plants should be grown from locally collected seed and cutting sources. Because irrigation is not an option in the landslide area that is the Reserve, seeding and planting should be implemented in the early fall to take advantage of the entire rainy season.

The following coastal sage and cactus scrub species are recommended for planting based on pre-fire vegetation maps: Artemisia californica, Encelia californica, Baccharis pilularis, Cylindropuntia prolifera, Eriogonum cinereum, Eriogonum fasciculatum, Isomeris arborea, Opuntia littoralis, Rhus integrifolia, Salvia leucophylla, Sambucus mexicana.

Depending on native species recruitment and soil seed bank, native seeding in areas dominated by exotic species may be an effective restoration tool. Figure 4 depicts several areas where native seeding could be used to restore areas where dominant pre-fire vegetation was non-native and Table 2 is a suggested seed mix to be applied to the burn area during the late fall/early winter, taking advantage of seasonal rains.

**TABLE 2: List of Recommended Native Seeds** 

PORTUGUESE BEND FIRE RECOVERY - RECCOMMENDED SEED LIST			
Scientific Name	Common Name		
Artemisia californica	California sagebrush		
Encelia californica	California encelia		
Eriogonum fasciculatum	California buckwheat		
Eschscholzia californica	California poppy		
Gnaphalium californicum	California everlasting		
Deinandra fasciculata	fascicled tarweed		
Isocoma menziesii	coast goldenbush		
Lasthenia californica	dwarf goldfields		
Lupinus bicolor	lupine		
Melica imperfecta	melica grass		
Nassella lepida	foothill needlegrass		
Nassella pulchra	purple needlegrass		
Phacelia ramosissima	California bluebells		
Plantago insularis	wooly plantain		
Salvia leucophylla	purple sage		
Salvia mellifera	black sage		
Vulpia microstachys	small fescue		

Portuguese Bend Reserve Restoration Areas Map Reserve Boundary Fire Boundary CSS Re-Vegetation and Weed Control Cactus Re-Vegetation
and Weed Control ::::: Targeted Weed Control

FIGURE 3: Proposed restoration areas and treatments for Portuguese Bend Reserve

Portuguese Bend Reserve Restoration Areas Map Reserve Boundary Fire Boundary Potential Areas for Native Seeding

FIGURE 4: Potential Areas for Native Seeding in Portuguese Bend Reserve

#### 2.4 MONITORING

It is recommended that basic monitoring be comprised of mapping the vegetation within the burn area in year one and again in year two post-fire. The California Native Plant Society's Rapid Vegetation Mapping protocol should be used to map community and stand level vegetation. The information collected will build on an established dataset from the 2009 PVNP vegetation mapping project and will help guide future restoration and management efforts.

#### 2.5 SUMMARY OF ACTIONS

The following actions are a summary of the recommendations outlined in the above Section 2 of this report:

# Task I: Project Preparation (December 2009 – January 2010)

Assess vegetation burn severity and soil seed banks using pre-fire vegetation maps; identify areas of sensitive plant and wildlife species; develop restoration and monitoring plans for and wildlife recovery; assess need for native seeding in areas dominated by exotic species and along unauthorized trails.

# Task 2: Targeted Invasive Species Removal (January 2010 - March 2011)

Implement invasive plant species removal within the burn area. Priority will be based on PVPLC's NCCP Targeted Exotic Removal Plant Program guidelines, which use a synthesized rating system drawn from plant invasiveness rankings from both the California Invasive Plant Council and the California Department of Food and Agriculture. Removal methodologies will include, but are not limited to: herbicide, hand removal, mechanical weeding.

# Task 3: Supplemental Native Planting (February 2010 – March 2011)

Mature cactus scrub and coastal sage scrub container plants, grown from local seed stock, will be planted in areas historically occupied by covered species, depending on assessments made in Task 1. Planting will only be supplemental, along disturbed trails and in known listed species habitat, as passive recovery of the area will be the priority.

#### Task 4: Trail Realignment and Enhancement (December 2009 – March 2011)

Projects will include the realignment of the Toyon, Fire Station and Rim Trails, enhancement of authorized trail, and closure of unauthorized trails all in the effected burn area to allow for better user access, long-term trail sustainability and reduced native habitat disturbance.

## Task 5: Post-Fire Recovery Mapping and Monitoring (April 2010 – March 2011)

Monitoring will be comprised of mapping the burn area in year one and again in year two post-fire. The California Native Plant Society's Rapid Vegetation Mapping protocol will be

used to map community and stand level vegetation. The information collected will build on an established dataset from the 2009 PVNP vegetation mapping project and will help guide future restoration and management efforts.

# Task 6: Public Education and Signage (December 2009 - March 2011)

Installation of entrance and major trail signs increasing the awareness and educating users on trail closures and access, Peninsula fire history, fire ecology, and living in a fire-prone landscape.

## **SECTION 3 – RESEARCH**

#### 3.1 RESEARCH OPPORTUNITIES

The PVPLC's goal is to increase research on our preserves through collaboration and partnerships, as well as, to develop and implement research projects addressing broader applied and theoretical scientific questions. Opportunities in the post-fire environment of the Reserve are many for all disciplines and academic level. For more information, please visit PVPLC's website (www.pvplc.org).

FIGURE 5: Before and after photos within the burn area of the Reserve



September 2009 Ishibashi Trail



June 2009 Burma Road Trail



September 2009 Burma Road Trail



#### **SECTION 4 – PUBLIC RESOURCES**

# 4.1 FREQUENCY ASKED QUESTIONS

Palos Verdes Fire: August 27, 2009 Frequently Asked Questions

- I. How did the fire start?
- Authorities are still investigating the fire, but we understand that it was caused by an electrical malfunction and was not a natural occurrence.
- 2. What burned?
- The Peninsula is fortunate not to have suffered more damage than it did. 2 outer structures were damaged within Rolling Hills. We are incredibly grateful for the service of the talented fire fighters and air support as they tirelessly worked to protect homes and structures that were being threatened by this blaze.
- On Land Conservancy-stewarded land, some signs were lost, as well as about 180 acres
  of mixed native and non-native vegetation including rare coastal sage scrub and cactus
  scrub. This loss constituted 45% of the Portuguese Bend Reserve.
- 3. What is the impact of fire in the Palos Verdes Nature Preserve?
- Natural fires on the Peninsula are very rare. Of the 62 fires recorded on the Peninsula in the last 40 years, only I was caused by natural events, like lightning.
- The Peninsula's flora evolved with occasional fires. Seeds germinate from the seed bank in the soil and most trees and shrubs re-sprout from their bases.
- There are also several unique fire follower species plants that thrive within the nutrientrich and low-competition conditions that follow a fire. Some of the more widely known fire-follower species that are native to the Peninsula are Whispering bells and Phacelia.
- 4. Some have said that fire is actually good for the ecosystem on the Peninsula
- The Peninsula's unique plant communities are adapted to particular fire patterns, not fire in general. Too much fire or fire at the wrong time of year can seriously damage or even completely eliminate many of the Peninsula's native ecosystems.
- The Peninsula's ecosystems are currently under recovery from over a century of impacting activities, including the introduction of invasive plants.
- 5. Are there particular threats to the recovery of habitat?
- The primary threats to the recovery of the Peninsula's natural areas are invasive weeds and the potential lack of native seed source. We will need to protect the burn areas, and are assessing the best way to do that.
- 6. What is the plan for protecting against mudslides and erosion?

- The City of Rancho Palos Verdes is continuing to work with specialists and engineers to determine the best and most appropriate plan to protect against mudslides and erosion following the fire.
- Permanent native vegetation is the best long-term solution to soil stabilization and erosion control.
- Some replanting is possible, in combination with other measures, using native plants and seeds. This is especially important in areas such as the Peninsula where the species tend to be rare and unique.
- 7. What is the plan for ecological restoration, and how do you know which strategies are the best ones?
- There are three major elements in the ecological restoration of disturbed areas after a fire
  - Allowing the native plants in the area to germinate from the seed bank or re-sprout from stumps or root systems, which requires protecting them from damage that may come from trampling;
  - Control of non-native weeds that would also germinate or re-sprout after a fire event. These nonnative plants can diminish or even prevent the success of the natural restoration process; and
  - Controlling or minimizing the effects of the fire on the structure of the soils, particularly on steep slopes, which means protecting them from disappearing due to mud slides.
- The first element requires management of strict adherence to the approved trail network, which could include, for example, their exclusion from sensitive burned areas by fencing. The second requires control measures against the non-native invasive plants, for example, through their removal. The third requires monitoring and adaptive management with the potential use of erosion control devices.
- Replanting with native plants can help the recovery of certain areas that were particularly denuded or that require special attention.

### 4.2 PUBLIC RESOURCES

#### www.wildfirezone.org

The Wildfire Zone creates awareness of wildfire risks and hazards and offers tips on how to reduce them. English and Spanish.

# www.fire.lacounty.gov/forestry/FirePlan.asp

This site offers guidelines on brush clearance and vegetation management and general fire information for Los Angeles County.

# www.nytimes.com/2007/11/03/opinion/03fotheringham.html? r=1&oref=slogin

Op-ed article by C. J. Fotheringham, Jon E. Keeley and Phillip W. Rundel on fire in Southern California.

http://www.voiceofsandiego.org/articles/2007/11/05/news/03fire110507.prt

Article on post-fire recovery of native species by Rob Davis.

http://lasgrwc2.org/Files/document/The%20Fires%20This%20Time%20Post-

Fire%20Recovery%20Best%20Practices Fall2007.pdf

Watershed Wise Magazine "The Fires This Time: Post-Fire Recovery Best Practices" issue.

# http://groups.ucanr.org/SAFE/

Information for safe, sustainable, and fire-safe landscapes.

# **SECTION 5 - REFERENCES**

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