

5. SYSTEM-WIDE MANAGEMENT ACTIONS AND PRACTICES

5.1 INTRODUCTION

The Significant Natural Areas encompass a variety of habitats and climatic variations, certain issues commonly occur throughout them. This section first presents these common issues and recommendations. These system-wide issues and recommendations are referenced where appropriate in discussions of specific Natural Areas (Section 6). In addition, this chapter describes standard Best Management Practices (BMPs) that can be used to address issues such as erosion and pathogen control during vegetation management.

5.2 SYSTEM-WIDE ISSUES AND MANAGEMENT ACTIONS

VEGETATION

Issue GR-1: San Francisco's natural heritage is housed in Natural Areas. These Natural Areas are threatened by invasive plant species (e.g., annual grasses, blue gum eucalyptus, and French broom). These species are responsible for historic and on-going loss of biodiversity. Invasive plant species are capable of spreading rapidly and displacing native plants because they are adapted to similar climatic conditions, lack predators or pests and/or have other characteristics that make them thrive. Invasive plants change ecosystem function and displace native species (Bossard et al. 2000). If left alone, Natural Areas would contain only a handful of invasive weeds and the animals that rely on the diversity of native plants would go extinct. Removal of invasive vegetation results in opportunities for revegetation and augmentation of species that are declining or have disappeared in the City. Recently restored areas may also be subject to higher rates of invasion than established habitats and, therefore, follow-up maintenance of weed control of restoration areas is critical.

Recommendation GR-1a: The invasive plant populations shall be reduced (see specific sections in Chapter 6 for species and areas). Because MA-1 areas hold the most valuable landscapes for conservation, invasive weed control shall be focused in those areas first, followed by MA-2 and MA-3 areas. While this is a general guideline, priorities may shift toward MA-2 and MA-3 areas because additional resources, such as capital funds or stewardship groups are made available. The general control strategy for MA-3 areas shall be to reduce and control the spread of invasive plants into neighboring MA-1 and MA-2 areas. Some invasive plant species known to support birds, butterflies and other beneficial insects will be maintained in MA-3 areas.

Recommendation GR-1b: Where native plant seed banks do not exist or have diminished, revegetation with appropriate native species shall occur. In most cases, native species shall be planted to approximate the diversity, cover, and density of adjacent habitats or reference sites in similar habitats (Appendix B).

Recommendation GR-1c: Restoration activities shall be conducted during the appropriate time of year and at an appropriate scale to avoid impacts to wildlife and minimize erosion (see GR-4b and Section 5.3). In general, at any one time, the area of vegetation removal shall be relatively small to minimize the potential for erosion. If necessary the Best Management Practices discussed in Section 5.3 shall be implemented to minimize erosion.

Recommendation GR-1d: In areas where it may not be feasible to reduce large infestations of invasive vegetation immediately, containment actions along the interface between the native and non-native habitats shall occur. Given the existing resources of the NAP, this strategy is the most realistic approach to invasive weed control in MA-3 areas.

Recommendation GR-1e: Management Areas, restoration areas, and other sensitive habitats shall be routinely monitored for invasion of undesired plant species (Section 7).

Issue GR-2: The diversity of San Francisco's flora has declined by almost half since 1958. The Significant Natural Resource Areas contain several vegetation series and many individual species of limited distribution and significant local importance. For example, red fescue prairie is found within four Natural Areas and amounts to a total of only 1.06 acres. There are many other vegetation series of limited distribution within the system (Table 3-3). In addition, 67 species of special-status plants occur in limited numbers through the Natural Areas (Table 3-4). For example, San Francisco spineflower (*Chorizanthe cuspidata* var. *cuspidata*) was recently discovered during restoration activities near Impound Lake (Section 6.1) and the only population of yellow-eyed grass known in San Francisco can be found in Glen Canyon Park (Section 6.3).

Recommendation GR-2a: Invasive weed reduction and management in areas supporting these species and series shall be prioritized over other activities (see Recommendation GR-1a).

Recommendation GR-2b: These sensitive species shall be given priority in revegetation and reintroduction activities throughout Significant Natural Resource Areas. Augmenting existing populations and (re)establishing or (re)introducing

additional populations where they once occurred (or were likely to have occurred) will help to ensure their continued survival in the City. The evaluation of historic occurrences provided in Appendix E, shall guide reintroduction activities. These species shall be broadcast by seed or propagated and then planted in appropriate habitats and in natural areas where long-term survival will be most successful (see Section 2.3). Plants shall be installed at densities and in composition that correspond their natural distribution and take into account the species life history and population biology.

Recommendation GR-2c: Efforts shall be made to protect the areas containing these species from human-generated disturbances.

Recommendation GR-2d: Plant populations and vegetation series of limited distribution shall be closely monitored to ensure their continued survival (Section 7). If the monitoring data show that populations are declining or unstable, efforts shall be made to ensure the survival of these species. These efforts include increasing the population size by planting or changing the management regime (see Recommendation GR-2b).

Issue GR-3: Grasslands in natural areas are a focal point for restoration. Non-native grasslands represent a relatively large area within natural areas and hand weed control (including spraying, manual removal, or mechanical removal) at that scale may not be feasible. Furthermore, the interruption of natural process such as fire and native herbivore grazing has resulted in conditions favorable to the non-native species. This means that native grasslands within many Natural Areas are at risk of being over-run by invasive species because conditions may not be optimal for supporting native species.

Recommendation GR-3a: SFRPD shall carefully monitor native grasslands and control invasive species (see Recommendation GR-1a through 1e).

Recommendation GR-3b: SFRPD shall explore non-manual methods of grassland management for large grassland expanses. Prescribed fires can help native species germinate and control invasive plants. Similarly, controlled grazing could reduce the populations of undesirable species and improve conditions for native grasses. In both of these methods, the management action is applied before the native grasses sprout or after they have finished setting seed. Any prescribed burns recommended by this Management Plan will only be implemented if approval from the fire marshal and the Bay Area Air Quality Management District is received. Prescribed fires will only be possible during the winter rainy season and will only be pursued when no alternatives for restoration are available. Goat grazing has been implemented with some success

and is likely a more viable alternative to fire. When using goats to control grassland weeds, SFRPD shall consider the herd size and the potential negative effects that large herds can have on erosion and soil stability.

WILDLIFE

Birds

Issue GR-4: Nesting birds (resident species, neotropical migrants, and other species of concern) are sensitive to direct human disturbance and human-generated changes to the environment. These species could be affected by human activities including vegetation management, recreational use, and off-leash dog use if these activities were to occur in spring. In addition, brown-headed cowbirds (*Molothrus ater*) are common throughout the City and likely parasitize the nests of most species of songbirds in the area (Murphy 1999). The combination of nest parasitism and disturbance could place significant pressure on native passerine (songbird) species. When coupled with relatively poor quality habitat at many Natural Areas, it is not surprising that local bird populations continue to decline. However, restoration activities also make it possible to substantially improve the quality of available habitat and can help offset some of these pressures.

Recommendation GR-4a: If resources are available, conduct annual breeding bird surveys using standardized point count or transect methodology to develop a list of species nesting, or suspected of nesting, in Natural Areas. Surveys should be conducted following a variation of standard Breeding Bird Survey (BBS) methodology (Sauer et al 2005). The BBS technique requires 3 minute stops at 0.5-mile intervals during which time all birds heard or observed within 0.25 mile are recorded. Obviously this doesn't work for the Natural Areas, but if counting stations were established within each Natural Area in such a way as to cover the different habitats, the same 3-minute listening count would still result in the collection of valuable information about bird use. This database of information would allow for the proper planning and coordination between management activities, especially tree pruning, to effectively enhance the habitat used by breeding birds.

Recommendation GR-4b: Vegetation management activities that are likely to affect breeding birds (pruning, tree removal, ground cover removal, etc.) shall not be conducted during the breeding season (April 1-September 1) unless 1) projects began prior to the breeding season such that the area has already been disturbed or 2) a breeding bird survey is conducted first. If active nests are discovered, a 150-foot radius avoidance buffer shall be centered on the nest site to prevent disturbance of the

nesting birds while using power tools. Hand weeding may occur to within 50 feet of the nest.

Recommendation GR-4c: If continued surveys indicate that parasitism by brown-headed cowbirds is a significant problem, SFRPD shall consult with the California Department of Fish and Game and the US Fish and Wildlife Service to determine proper protocols to minimize the effects of this species.

Recommendation GR-4d: Cut brush and trees provides material that may be used to improve nesting or escape habitat for ground-dwelling birds and to mitigate the potential loss of habitat due to vegetation clearing. Brush piles can be created by staking cut brush and debris in an irregular, yet somewhat compact, manner. Brush piles shall be located out of public sight wherever possible and to avoid creating public safety hazards. Where feasible brush piles shall be placed at a maximum of 50 feet from existing dense cover. Hedgerows created from cut material shall be placed so that they connect scrub habitats and provide movement corridors for ground-dwelling birds.

Recommendation GR-4e: Create corridors of shrub species such as coyote bush, coffee berry, lizard tail, native rose, and lupine between landscaped areas and Natural Areas to provide cover and transitional habitat for birds and other wildlife. This could also help control off trail use, minimize erosion, and could improve the look of a Natural Area.

Issue GR-5: Grasslands within the Natural Areas provide important foraging habitat for resident and migratory raptors. These areas are under continual invasion pressure from adjacent forest and scrub communities. As shrubs and trees spread into the grasslands, the grasslands lose their ability to support the prey base that is required by birds of prey. Some habitats may actually support a higher prey base, but because of the structure of the vegetation, access to that prey base is blocked. For example, the conversion of grassland to Himalayan blackberry scrub may increase food for small mammals (mice, rats, voles, etc.) but the blackberries will protect those same mammals from red-tail hawks who can not capture prey through the berries.

Recommendation GR-5a: Implementation of GR-1a through 1e and GR-3b will help preserve grassland form and function throughout the Natural Areas. In general, invasive trees and shrubs should be prevented from colonizing existing grasslands. If possible, the creation and enhancement of mosaic grassland/shrub habitats should be emphasized. These habitats provide both cover and food sources for small mammals, but also allow foraging habitat for raptors.

Issue GR-6: Nesting habitat for bird species that require cavities (e.g., wood ducks, woodpeckers, owls, bluebirds, etc.) is often limited within the Natural Areas. Natural cavities are preferred over nest boxes, but both can help support cavity-nesting species.

Recommendation GR-6a: Snags (standing dead trees) and dead branches on live trees shall be left in place unless they are a hazard to public safety or contain significant harmful insect or disease infestations. They provide important breeding habitat for cavity-nesting birds and perching sites for raptors.

Recommendation GR-6b: Where natural cavities are not available or are in limited supply, provide nest boxes for species such as western bluebirds, western screech owls, woodpeckers, tree swallows, etc. These shall be located in habitats that are appropriate for these species (e.g., bluebird boxes in the scrub and grasslands, and woodpecker and owl boxes in the forest). The boxes shall be constructed as designed for specific species, then installed, and maintained. Annual maintenance of nest boxes is necessary during the non-nesting season, typically September 1 through January 31. During this maintenance all boxes shall be inspected, repaired as necessary, and cleaned of old nesting materials.

Recommendation GR-6c: Provide nest boxes for wood ducks at Impound Lake (Lake Merced), Sharp Park, and Pine Lake. Nest boxes shall be constructed, monitored, and maintained according to the specifications provided by the California Waterfowl Association (CWA 1999). It may be possible to get assistance with this project from the California Wood Duck Program, sponsored by the CWA.

Mammals

Issue GR-7: Predation by cats, both feral and those allowed access to the outdoors, has a significant adverse impact on nesting birds and small mammal populations. Within the City vegetated areas that support native birds and small mammals are relatively few and small. Because wildlife is limited by suitable habitat, and therefore concentrated in these locations, the effects of free-roaming cats on wildlife within the Natural Areas could be substantial. It is estimated that birds make up 20-30 percent of a cat's prey, the remaining 70-80 percent is small mammals (Coleman and Temple 1996). Bird populations are impacted by free-roaming cats, outdoor house cats and cats in colonies.

Free-roaming cats - In one of the most frequently cited studies of cat predation on birds, the authors estimated that the free-roaming cats in Wisconsin took between 7.8 and 219 million animals per year (Coleman and Temple 1996). Obviously these estimates are fraught with assumptions (number of cats, predation rate, and percentage of the kill that are birds), but if

they are accurate to an order of magnitude, the number of birds killed by cats is in the millions per year within this one state. Additionally, because birds only make up about 20-30 percent of the prey items, the number of small mammals taken would be even higher.

Outdoor house cats - A more recent study of breeding birds in southeastern Michigan focused on house cats that were allowed access to the outdoors. The study was limited to predation during the breeding season (April through August) and included residents along three survey routes totaling approximately 75 miles of roadway. Surveys were sent to landowners along those routes. Based on the landowner responses, on average, each cat caught 15 birds during that five-month period, however, when only the cats that were reported to have preyed on birds were evaluated the average number of birds per cat was 31 (Lepczyk et al. 2004). A total of 3,680 birds were reported preyed upon during the breeding season. The authors of the study indicate that this total is likely low because there were probably cat owners that did not respond, prey items that were not noticed, etc (Lepczyk et al. 2004). The authors estimated that between 800 to 3,100 cats along the 75 miles of survey route could be killing between 16,000 and 47,000 birds during the five-month breeding season (Lepczyk et al. 2004). Twenty-three species of bird were reported captured, mostly species that feed on or near the ground (Lepczyk et al. 2004). This study evaluated the difference between rural and urban landscapes and they found that there was no difference in predation rates between the two and that predation rates were similar at locations with bird feeders to locations without feeders (Lepczyk et al. 2004).

Feral cat colonies - In an evaluation of the feral cat colonies in Florida, the Florida Fish and Wildlife Conservation Commission indicated that there were between 6.3 and 9.6 million feral cats in the state. When combined with cats that were allowed access to the outdoors, they concluded that there could be between 12.1 and 15.4 million cats in Florida that have the opportunity to prey on wildlife (FFWC 2001). These cats are predicted to take as many as 271 million small mammals and 68 million birds each year (Hatley 2003). In a review of this issue for the US Fish and Wildlife Service, Hatley (2003) indicated that there were known feral cat colonies in 17 counties, the largest of which is on Key Largo and estimated at over 1,000 individual cats. This colony is located adjacent to a botanical reserve with known populations of the federally endangered Key Largo woodrat and Key Largo cotton mouse (Hatley 2003).

The San Francisco Society for the Prevention of Cruelty to Animals (SFSPCA) has had a Feral Fix Program in place since 1993. The cats are humanely trapped by members of special Cat Assistance Teams and transported to veterinary care. All cats receive vaccinations and are spayed or neutered. If socialization is possible, kittens, for example, are put up for adoption. Those animals that cannot be socialized are returned to the capture location and released and their ears "tipped" to allow for future identification. Since its inception in 1993, this program

has treated over 10,000 cats (SFSPCA No Date). Overall, the trap and neuter program is beneficial for both the cats and wildlife because it reduces reproduction rates of feral cats while the adoption of some animals removes them from the wild entirely.

While trap and neuter is beneficial to cats and wildlife, release of animals into or adjacent to Natural Areas may be problematic. Although specific predation rates by free-roaming cats on wildlife is unknown for San Francisco, the literature discussed indicates that cats do prey on wildlife. Therefore, return of cats to Natural Areas could contribute to the continued loss of wildlife in the City. While the argument can be made that wildlife within the Natural Areas is declining for other reasons and that cats are not the sole culprits, cats can contribute to the decline. While individual cats cannot be managed, the location of feral cat colonies can be. The SFRPD Natural Areas Program currently works with the San Francisco SPCA's Cat Assistance Program over issues regarding cat feeding stations.

Recommendation GR-7a: The SFRPD shall implement the policy toward feral cat control as adopted from the Quail Recovery Plan and approved by the Commission on the Environment on January 14, 2004. The Quail Recovery Plan reads "Removal and relocation of predators may result in the death and other unintended negative consequences. Therefore, any proposed removal or relocation of predators of any kind must be submitted in writing to the San Francisco Recreation and Park Department for review and recommendation. In each proposed case, the Department will consult with the San Francisco SPCA to determine whether the relocation or removal is feasible and, if so, how best it can be done. If the relocation or removal is approved by SFRPD, the Department will utilize the pro bono services of SF/SPCA to accomplish the task unless SF/SPCA declines to participate."

Recommendation GR-7b: Ultimately, the feral cat issue is one that is generated and perpetuated by humans. The only long-term solution to this problem is to eliminate the release of unwanted animals into the wild. While the entire effort is outside the scope of this management plan, the SFRPD can help in this goal. The SFRPD shall develop outreach materials to educate neighbors and users of Natural Areas about feral cats, including adoption, spay/neuter and SPCA's Cat Assistance programs. Information regarding other programs such as the Cats Indoors, which sponsored nationally by the American Bird Conservancy (<http://www.abcbirds.org/cats/>) and locally by the Golden Gate Audubon Chapter, shall be made available to residents. The Cats Indoors program has educational material available for purchase or download.

Issue GR-8: Dog walking is a very popular recreational activity in Natural Areas. The effect of dogs on Natural Areas is extremely variable and can depend on the owner's action and responsibility, the dog's behaviors, and site-specific conditions.

Owner Action and Responsibility – Owner behavior plays an important role in the type of impact dogs may or may not have on natural resources. For example, a person walking with a dog on trail has less of an impact than a person throwing a ball up a hill for the dog to chase. If dogs are allowed or encouraged by owners to dig, run or chase wildlife in Natural Areas, soil, plant and animal resources may be negatively effected.

Dog Behavior – Dogs that remain on paths present little or no disruption to wildlife because the compaction or trampling by dogs walking on trails does not differ significantly from human use of trails. When dogs run off-leash, especially up and down steep slopes, native plant community and slope integrity can be degraded. In addition, some on- and off-leash activities such as dog digging and dog waste can disturb soil and plant resources and compromise the long term health of ecosystem.

Site Specific Conditions – How and to what degree such activities will have an impact, will be influenced by site specific conditions such as slope (steepness), soil type (sand versus clay) and the type native plant habitat (grasslands and dunes tend to be less resilient than urban forest and coastal scrub).

Potential negative impacts associated with dog use of parks can include:

- disruption of wildlife feeding and nesting;
- soil erosion and disturbance and promotion of weed growth associated with digging and running on slopes;
- direct native plant and animal loss resulting from hunting or capturing, urinating, and digging; and
- increases in nitrogen from dog waste that promote the growth of invasive weeds.

There are 43 acres of land in parks that are currently designated for dedicated dog activities. The Dog Policy adopted by the Recreation and Park Commission in 2002 allows for three types of dog access on SFRPD land: off-leash, on-leash, and no access.

Off leash Access - According to SFRPD's Dog Policy, off-leash dog activities are allowed only in designated Dog Play Areas (DPAs). Of the 25 DPAs currently operating on SFRPD land, 6 exist in parks with Natural Areas. New DPAs can be created through a community process coordinated through the Dog Advisory Committee (DAC) and described in the Dog Policy.

On leash Access - In all other City park lands not designated as a DPA or specified as a no dog area, dogs are allowed on-leash. Given the need to manage dog impacts on Natural Areas the rarity with which on-leash regulations in Natural Areas have been enforced creates management issues and conflicts among park uses.

No Dog Access - Some areas including athletic fields, courts, children's play areas, and sensitive habitat areas may be off-limits to dogs and thus exempt from consideration as DPAs. (See Section 3.0 of the Dog Policy).

According to Section 2.0 of the Dog Policy, Sensitive Habitat Areas include:

- Sensitive wildlife areas such as breeding habitat for birds;
- Sensitive remnant native plant communities such as wetlands;
- Sensitive plant populations such as locally rare wildflower species;
- High erosion prone areas; and
- Active restoration areas (temporary exclusion only).

“These areas support or are likely to support locally important, rare threatened or endangered species (examples include red-tailed hawk nesting sites, heron rookeries, cormorant nesting colonies, red-legged frog habitat, western pond turtle habitat, wetlands, quail habitat areas). Sensitive Habitat Areas are areas within designated Natural Areas that would be off-limits to dogs.”

While the Dog Policy states, as was known at the time of its adoption, “Of approximately 500 acres of Natural Areas available for recreational use, approximately 20 percent would be considered Sensitive Habitat Areas. The remainder of the Natural Areas (approximately 400 acres) would be potentially available for off-leash, on-leash or on-trail DPAs.” This plan provides updated acreage data. A total of 861 acres of Natural Areas occur in San Francisco with approximately 617 of those acres on land (excluding water area of Lake Merced). Therefore the potential 100-acre sensitive habitat area acreage in San Francisco is 12 percent and 16 percent, respectively, instead of the afore mentioned 20 percent.

Recommendation GR-8a: Retain boundaries and locations of the six existing DPAs in Natural Areas. No changes are recommended for the DPAs at Corona Heights and Pine Lake Park (see Sections 6.11 and 6.7, respectively). The Corona Heights DPA is a fenced area at the base of the Natural Area. The Pine Lake Park DPA includes the grassy meadow east of Pine Lake. Both of these DPAs are spatially separated from the Natural Area.

The DPAs in Buena Vista Park and Lake Merced do not currently have high use, but if use patterns change in these areas, the DPA should be redesigned or relocated (see Sections 6.10 and 6.1 respectively).

Finally, the DPAs at McLaren Park and Bernal Heights should be modified to protect sensitive habitat areas (see Sections 6.19 and 6.21, respectively). At McLaren Park, the creek area (Gray Fox Creek) should be made off-limits to dogs and the surrounding quail habitat should be available for on-leash use only. These modifications would

result in a 0.6 acre reduction in human and dog access and a conversion of 7.7 acres to an on-leash area. If these recommendations are implemented, the 60 acre off-leash area at McLaren would be reduced to 51.5 acres. At Bernal Heights, this plan recommends conversion of 8 acres of off-leash area on the northwest side of the hill to on-leash and the potential addition of 4.5 acres below Bernal Heights Boulevard, resulting in the potential loss of 3.5 acres to off-leash recreation.

Recommendation GR-8b: When considering new DPAs within or adjacent to Natural Areas, on-leash and-off leash dog use should be matched with the sensitivity of the habitat. The highest impact dog use, off-leash recreation, should occur in the least sensitive habitat areas (MA-3 areas). In MA-1 and MA-2 areas dogs should be held on-leash. Currently, all MA-1 and MA-2 areas, excluding those in existing DPAs (Lake Merced, McLaren Park, Bernal Hill, and Buena Vista), are on-leash parks; however many people use these on-leash areas for off-leash recreation. If dogs and people stayed on-leash and on-trails in MA-1 and MA-2 areas, most impacts associated with dogs would be eliminated.

The MA-3 areas are the least sensitive habitat areas and are most appropriate for consideration by the DAC as off-leash areas. Most MA-3 areas lacking steep slopes could be considered as off-leash DPAs. Examples of appropriate off-leash areas in MA-3 areas include the tops of Billy Goat Hill and Kite Hill. If a proposed DPA is located next to an MA-1 or MA-2, the boundary between those activities may require fencing. For example, if an off-leash trail were established on the west side of Islais Creek in Glen Canyon, some sections of the creek may require fencing. For typical low rustic fence designs, see Appendix H.

Recommendation GR-8c: At this time, this plan proposes to restrict dogs from only three sensitive habitat areas. In McLaren Park (see GR-8a above and Section 6.19) access to a 0.6 acre creek area would be eliminated. In addition, at Sharp Park, access to habitat used by the federally endangered San Francisco garter snake (*Rana aurora draytonii*) and federally threatened California red-legged frog (*Thamnophis sirtalis tetrataenia*) is proposed to be restricted (see Section 6.4). This is a 33.3 acre area. Finally access to the water at Pine Lake should be restricted. This is a small lake and wetland (1.7 acres) used by migratory and resident wildlife (see Section 6.7). Public access to the water's edge will continue at the beach access (soon to be renovated) on the eastern side of the lake. For logistical and aesthetic reasons, access to the water can not be fenced at the east end beach. Therefore, at Pine Lake, signs stating that dog access to the water is restricted shall be posted at the east end access. These three proposed no access areas total 35.6 acres, which include 2.3 acres in San Francisco and 33.3 acres in the City of Pacifica.

Additional sensitive habitat areas have been identified in Natural Areas but these areas are not currently proposed for any dog access restrictions. These areas include habitat for endangered mission blue butterfly at Twin peaks (5.9 acres), Bayview Hill (1.3 acres) and McLaren Park (0.4 acres), as well as salt marsh wetlands at India Basin (2.3 acres), and the creek channel and wetlands at Glen Canyon (1.8 acres). Some of these 12.3 acres are located next to or surrounding trails. If park users (and dogs) stay on trails, no further access restrictions or fencing would be required. However, if lack of enforcement and compliance with leash laws continues and/or damage to sensitive habitat areas is observed, SFRPD should consider restricting access to these sensitive habitat areas, as described in the Dog Policy, including physical barriers. Permanent physical barriers are viewed as a last resort to be used only after signage and other soft solutions have been shown to be ineffective. If fences are installed public access would still be allowed on designated trails; however, low trailside fencing would be installed to discourage people and dogs from drifting off-trail (see Appendix H for examples of low rustic fencing). If through monitoring these sites, it is determined that all 12.3 acres of sensitive habitat required trailside fencing, a maximum of 3,900 linear feet of trail, or less than 3 percent of all trails, would contain trailside fencing.

At this time 47.9 acres of sensitive habitat have been identified for monitoring or closure in San Francisco (14.6) and The City of Pacifica (33.3). According to the Dog Policy, dog access can be restricted from up to 100 acres of sensitive habitat in San Francisco. Any further restrictions in dog access in Natural Areas that include either installations of fences or other physical barriers or change in policy that are not covered in this plan should be presented to the DAC for review and the Commission for approval prior to implementation. Thus the public will be informed and will have an opportunity to comment on the proposed changes prior to implementation. It is anticipated that any future restrictions would be located exclusively within MA-1 and MA-2 areas.

Issue GR-9: Important elements within natural habitats for survival of small mammals, reptiles, and amphibians include underbrush, fallen logs, loose rocks, and rock outcrops. These elements are limited in their distribution and number.

Recommendation GR-9a: These elements shall be preserved when feasible during vegetation management activities and in appropriate locations throughout natural areas. See the discussion of brush piles above (see Recommendation GR-4d).

Invertebrates

Issue GR-10: Historically, native grassland habitats within the Significant Natural Resource Areas supported a wide array of butterflies and other insect species (e.g., native bees and dragonflies). However, a decline in species diversity has been documented over the last 30 years. This decline has likely been the result of native habitat loss due to development and increases in invasive plants. In some cases, the insect species that remain have adapted to using invasive plants such as fennel and English plantain.

Recommendation GR-10a: As invasive plants are removed, plant species that are beneficial to local insects. In revegetation efforts, favor native species that are suitable nectar and larval host plants for these species, such as those from the mallow, carrot, sunflower, and legume families. Good native host plant species include *Lomatium* spp, aster, yarrow, thistle, yampah, and buckwheat. Also consider reintroduction of host plant species that were historically present (Appendix E).

Recommendation GR-10b: In MA-3 grasslands, some invasive plant species that are host plants for local butterflies and other native insects will be maintained. These species will be prevented from spreading to MA-1 and MA-2 regions and threatening the native grassland community (GR-1a)

SOILS, EROSION, AND PUBLIC USE

Most public use in natural areas is associated with trails (see Section 3). Public use of natural areas is not expected to decline, and management of the Natural Areas should consider that such use will increase over the next 10 years, especially when making decisions about improving, maintaining, closing or relocating trails. Significant numbers of homeless people use some of the parks, specifically the Oak Woodlands area of Golden Gate Park. This use has impacts that range from vegetation removal to creation of social trails to accumulations of trash and human waste. SFRPD, in concert with the San Francisco Police Department, has procedures to address homeless use of parks. Recommendations for solutions to this problem are beyond the scope of this document.

Issue GR-11: Expanded and improved trail infrastructure, along with additional nature viewing experiences, has been identified as the most important and most needed park improvement to San Francisco's (see Section 3.4). Based on the current inventory, there are over 40 miles of trails within Natural Areas. At most sites, trails in Natural Areas did not receive regular maintenance or improvements prior to the creation of the Natural Areas Program and the trail system has suffered from this deferred maintenance. Also, many of the Natural Areas are covered with networks of social trails, which can create erosion problems.

Social trails may include minor trails that short cut, yet lead to the same place as, major trails. Often these trails go directly up and down slope with no steps, water bars, or other erosion control features. Social trails typically do not provide access to main points of interest in parks and are often associated with unauthorized activities. Well-planned formal trails are often subject to short-cutting of switchback, an action that tramples vegetation and exacerbates erosion. Erosion problems have been caused by excessive foot traffic that wears away the trails' vegetation, in some areas creating wide swaths of exposed soils. In addition to the following recommendations, refer to erosion-specific BMPs below (Section 5.3).

Recommendation GR-11a: Maintain and improve primary designated trails as identified in this plan (see Section 6). Approximately 17.2 miles of trails are proposed for improvement and maintenance. Typical trail improvements will include wood steps and trail contouring as shown in Appendix H. Another 12.5 miles of trails are considered unimproved designated trails that will remain. An additional 0.8 miles of new trails are proposed. Finally, this plan recommends re-routing or closing 10.3 miles of trail (approximately 26 percent of total existing trails). Natural materials such as wood timbers will be used to improve and maintain trails (Appendix H, Figures H-1 to H-3).

Recommendation GR-11b: Public use in all Natural Areas, unless otherwise specified, should encourage on trail use. To reduce the deleterious effects of trampling in unstable areas, formal use areas, including designated trails, shall be created at locations that are sufficiently stable to withstand the pressure of public use (see GR-11a). Additionally, interpretive and park signs should be installed or modified as appropriate to include "Please Stay on Trails" with information about why on-trail use is required. Temporary fencing may be required to allow for damaged areas to be restored. If off-trail use continues in a particularly sensitive habitat (e.g., wetlands), permanent fencing shall be considered as a last resort once all other options, including enforcement, have failed. Fencing to be used will be low and rustic, so as to not block views and to blend with the surrounding landscape (see Appendix H).

Recommendation GR-11c: Natural Areas shall be monitored on a routine basis for the development of new social trails. Those that impact sensitive species or sensitive habitats or that contribute to erosion problems shall be closed or re-routed (see GR-11b) with signs and brush barriers. Temporary fencing will be used as a last resort in these areas if less obtrusive measure (signs, brush barriers) are not effective. Install appropriate biotechnical erosion control measures (coir rolls or matting combined with native vegetation) and/or water bars to repair area damaged by social trails and to prevent further erosion. Some of these measures are currently underway in several Natural Areas, but they need to be continued and expanded. Examples in Natural

Areas where erosion control measures were well designed and properly installed, serve as an example to be followed for other locations:

- At Tank Hill, the designated trail from Belgrave Avenue is curved to conform to the contour of the hill and the risers are tied back into the face of the hill to prevent erosion around the ends. The treads are broad enough to allow some infiltration to occur, thereby reducing the flow of water along the stairway. The recently installed stairways at Twin Peaks and Glen Canyon Park are also good examples of proper stair construction.
- Dead branches culled from the Tank Hill Natural Area were used to construct brush barriers along the stairway to discourage park users from walking on the delicate and dangerously steep slopes of the hill.
- Similar brush barriers were placed along trails at Tank Hill and encourage users to remain on the established paths.
- Signs on the brush barriers explain the program of native grass revegetation that has been undertaken in the Tank Hill Natural Area, and requests the users' assistance in maintaining and promoting the program.

These measures blend well with the park environment, are effective without intruding on the users' visual experience, and provide the public with a sense of participating in the rehabilitation process.

Recommendation GR-11c: Some formal trails lack amenities that may increase their use. Features such as overlooks or seating areas every few hundred yards along a trail should be considered when evaluating overall trail use. Creation of this type of feature would benefit habitat values by encouraging foot traffic to avoid more sensitive areas.

Recommendation GR-11d: In order to maintain and enhance public recreational experiences, viewshed should be maintained. Key viewsheds can be blocked by planting trees and other large vegetation that block key public access points and view. Views from hilltops and across large natural areas are particularly important for the recreational trail user. Viewshed for park safety shall also be considered.

Issue GR-12: Most of the Natural Areas occupy sites characterized by steep, erosion-prone slopes. Many of these locations exist as parks today because building homes or streets on such steep hillsides was considered infeasible. The soils in the steepest portions of these hillsides tend to be thin, sandy, and rocky, with limited vegetative cover. This combination of factors (steep slopes, thin soils, sparse vegetation) makes the areas highly susceptible to erosion from wind, rain, and trampling. The effects of wind and rain are increased when trampling removes the sparse vegetation and disturbs the unstable soils. When other factors are equal, the severity of erosion is directly related to the level of uncontrolled public use, including the creation of social trails with little regard to slope, substrate, or vegetation (see GR-11).

Therefore, the greater the uncontrolled use of the site, the more severe the erosion of the steep hillsides.

Recommendation GR-12a: To promote general soil stability on steep slopes, areas of unusually thin vegetation cover shall be revegetated (see GR-1b). This includes revegetation of areas where invasive plants are removed. Revegetation may not be possible on some rocky thin soil areas. Many areas with thin vegetation cover are high in native plant diversity and may need to be temporarily fenced to maintain soil stability.

Recommendation GR-12b: Work that involves exposure of large areas of soil shall be completed during the dry season whenever possible. If this is not feasible, or if extensive areas of soil remain exposed after work is completed, revegetation or erosion control measures shall be implemented to control movement of soil from work sites during storms. An example of a temporary method of reducing downslope erosion is to install a row of abutting, securely anchored straw bales as required on work area slopes. These bales would be removed once areas were revegetated. See Section 5.3 for additional erosion control Best Management Practices.

EDUCATION

Issue GR-13: There is little public awareness about native ecosystems and their importance to humans as well as native plant and animal species. However, because of the wealth of resources, ease of access, and diverse locations, the Significant Natural Resource Areas provide abundant ecological educational opportunities.

Recommendation GR-13a: The SFRPD shall continue to network with local schools and research institutions to provide environmental education resources and opportunities for school children in San Francisco. Additionally, SFRPD shall continue to identify research projects and funding opportunities for on-going research.

Recommendation GR-13b: The SFRPD shall develop signage appropriate for installation within Natural Areas that explains the importance of the natural resources, ecosystem functions, management activities and goals, and public involvement contacts. Installation of signs in large regional parks shall take precedence over signs in small parks (see Section 6). Signs already installed within Natural Areas shall be maintained and updated as required to provide current and correct information to park users.

Recommendation GR-13c: Educational materials, including signage to be installed at the appropriate locations and informational handouts, shall be created that discuss the impacts of feeding wildlife and wild animals as well as the problems associated with

releasing unwanted pets into Natural Areas. Specific topics to be discussed include transfer of disease, decreased sensitivity to humans, negative effects on other wildlife (in the case of pigeons), the potential long-term need for control of animal populations maintained by artificial feeding, and the impact of released predators on native wildlife.

FORESTRY

Issue GR-14: Urban forests found in Natural Areas are resources for people and wildlife. The year-round greenscape provided by urban forests, as well as the stature and character of these stands of large trees, are valued by residents and visitors. Also, urban forests provide shade and windbreaks that can enhance the park user experience. Urban forests are also valuable to wildlife providing nesting and foraging habitats for many species.

All urban forests in Natural Areas are classified as MA-3 areas. Of the approximately 362 acres of invasive forest, approximately 199 acres are classified as MA-3 urban forests. These urban forests are located in Bayview Park, Glen Canyon Park, Edgehill Mountain, Lake Merced, McLaren Park, Mount Davidson, Pine Lake, Interior Greenbelt, Dorothy Erskine Park, Corona Heights, Fairmount Plaza, and Sharp Park. It is estimated that about 35,000 trees occur in the MA-3 urban forests within San Francisco (see Appendix F for details on tree estimation methodology).¹ The MA-3 areas are, by definition, the lowest priority areas within Natural Areas (see Section 1). Urban forest stands that contain significant native plant understory and are planned for native plant and animal habitat restoration are classified as MA-1 or MA-2 and are not considered here. Recommendations for MA-1 and MA-2 areas are described in individual chapters in Section 6 and Appendix F describes the species to be removed, removal methodology, snag retention and debris removal, target basal area, impacts on aesthetics, potential windthrow hazards, sightlines, and other tree removal impacts.

The urban forests in Natural Area are comprised largely of mature blue gum eucalyptus with smaller numbers of Monterey cypress and Monterey pine. Many of these MA-3 urban forests were planted roughly at the same time and have reached maturity. In most cases these urban forests are dominated by large trees, although density often highest at forest margins. Management actions within MA-3 stands should promote age diversity. Many of the urban forests are heavily infested with ivy that climbs the trees eventually killing them. In other areas of the forest, mature trees are aging, damaged by storms, and potentially hazardous to Natural Area users. The size of trees within a given stand vary depending on the Natural Area, age of stand and past management actions. Some stands are mostly smaller trees (e.g.,

¹ There are about 118,000 trees within Natural Areas urban forests. Of these, about 54,000 trees are at Sharp Park; therefore, there are about 64,000 trees within San Francisco. MA-3 areas account for about 55 percent of the 362 acres of urban forest. So MA-3 acres should contain about 55 percent of the trees; about 35,000 (see Appendix F for calculation details).

Bayview Park) while others are mostly larger trees (e.g., Mount Davison). Stands within mature forests at Natural Areas tend to have fewer relatively large trees. For example one area of McLaren Park was estimated to have as few as 62 trees per acre, most of which were large (over 18 inches in diameter at breast height). The same survey in Glen Canyon Park resulted in over 1,400 trees per acre, most of which were small (less than 6 inches in diameter at breast height) while According to recent survey conducted by the Natural Areas Program, the average basal area per acre of the urban forests within Natural Areas ranges up to 600 square feet. Basal area measurements are a standard method used in the California Forest Practice Rules by the California Department of Forestry and Fire Protection for determining post harvest stand stocking levels after timber harvest operations (CDF 2005). Post harvest stocking levels refers to the density of trees in an area after tree removal activities have occurred. In a study of state-owned forest land in Hawaii, stocking of eucalyptus forests ranged from a low of 117 square-feet per acre to a high of 356 square-feet per acre (Constantinides 2000). For comparison, 300 square feet of basal area per acre could equate to 550 trees with diameters of 10 inches, or 22 trees with diameters of 55 inches, in a single acre.

Recommendation GR-14a: Urban forests within the MA-3 areas should be maintained with a basal area per acre of between 200 and 600 square feet. This range encompasses most of the existing MA-3 areas within the Natural Areas at this time. Management of the stands will be primarily driven by opportunities created the natural aging of the stand, or other natural factors which affect the health of the urban forest (e.g., windthrow, disease, insects, invasive species) but will focus on improving and maintaining the health of each stand. For example, if trees in the stand become infected with a disease, tree removal activities should be conducted to remove the trees to improve forest health and prevent the spread of the disease to other trees in the stand. In some cases, to achieve the management goals, periodic removal of trees in the MA-3 urban forests may be required.

Recommendation GR-14b: In order to maintain the forest as it ages, it is necessary to maintain a stocking range that will perpetuate the urban forest and promote forest health. Over time, it will be necessary to develop a new age class of trees, which will eventually replace the existing mature canopy. This will be accomplished through natural and artificial regeneration methods. Natural regeneration refers to the seedlings and saplings that establish naturally in the understory of the forest from seeds dropped by the overstory trees. Blue gum eucalyptus is likely to be the main species that regenerates naturally although the other invasive species also regenerate. Artificial regeneration refers to the planting of trees by people for management purposes. California native trees that offer the greatest value to wildlife such as Monterey

cypress, Monterey pine, and Douglas fir (*Pseudotsuga menziesee*) will be promoted when planting. Tree planting can take advantage of openings in the urban forest canopy that are created either naturally or from other management activities.

Regeneration rates for individual MA-3 stands will be determined by SFRPD staff or the SFRPD Arborist and generally conform to stocking rates between 50 and 150 seedlings, saplings or poles per acre. Areas exceeding 150 seedling per acre may require thinning of some suppressed or stressed trees or if overcrowding is adversely affecting forest health. In many cases, planted areas may not be as large a one acre. In these locations the SFRPD Arborist shall determine the appropriate stocking level.

Recommendation GR-14c: To promote forest health and removal of trees shall focus on the removal of dead or dying trees, trees with disease or insect infestations, storm damaged or hazardous trees, and trees which are suppressed because of overcrowding.

Recommendation GR-14d: No sensitive species shall be planted in the MA-3 urban forests.

Recommendation GR-14e: Removal of invasive ivy and blackberry may be required in some MA-3 stands to promote and maintain urban forest health. The stems of ivy that are growing into the canopy of trees can be severed near the base of the tree, but this should be done without damaging the tree itself. In areas where natural regeneration is limited by invasive plant species such ivy and Himalayan blackberry, artificial regeneration may be used if resources are available to prepare the site prior to planting. Site preparation could include removal of invasive understory vegetation; control of the initial growth of some invasive species; and the piling and chipping of woody debris. Urban forest weed and tree management may expose soils that would be prone to erosion. Erosion control measures described in Section 5.3 shall be implemented, where appropriate, for projects in the urban forest.

Recommendation GR-14f: The SFRPD Arborist will be consulted when tree removals or planting is proposed in MA-3 urban forest.

Recommendation GR-14g: To the extent possible, install trees and shrubs in the urban forests to promote species diversity and improve wildlife habitat. The diversity of species that will grow in the understory and in gaps will be limited by canopy density and chemical composition of the primary overstory trees proposed for the forest. These species, blue gum eucalyptus and Monterey cypress, suppress the growth and survival of many species. However, some species such as coast live oak (*Quercus agrifolia*), Douglas fir, and Monterey pine (*Pinus radiata*) may survive in gaps. These

trees have high habitat value and if planted around the edge of openings will enhance structural diversity in the forest. Toyon, oso berry, and elderberry appear to be the most tolerant of conditions in the eucalyptus understory. These species will improve wildlife habitat structural diversity where the canopy is denser.

5.3 BEST MANAGEMENT PRACTICES

EROSION CONTROL

Removal of vegetation prior to revegetation can create a situation where exposed soils may be subject to erosion. Most BMP manuals focus on management of exposed soils during construction projects. While these projects are different from those being conducted by the Natural Areas Program, some of the BMPs are applicable. The following is a brief annotated list of appropriate measures taken from the referenced documents. Each of these manuals is a public document that is available for free download from different internet sites. Full citations and webpage addresses are included in Section 8.

The California Department of Transportation (Caltrans) has published a document called *Guidance for Temporary Soil Stabilization* (Caltrans 2003). Hydroseeding and hydromulching involve a combination of seeds or straw mulch along with water and a binding material that forms a solid blanket over exposed soils. In hydroseeded areas the seeds in the mix germinate and root into the ground thus holding the soils in place. Hydromulching relies on the straw mulch to prevent erosion. While both of these applications are typically used for large-scale projects, some elements may be applicable to erosion control projects in natural areas. The three BMPs from the Caltrans manual that are more applicable to smaller scale projects include the application of straw mulch (SS-6), rolled erosion control products (SS-7), wood mulch (SS-8), silt fences (SC-1), and fiber rolls (SC-5) (Caltrans 2003).

- Straw Mulch (SS-6) – This method lends itself to quick applications of areas where long-term erosion protection is not required. One of the limitations to the application of straw mulch is that if it is not anchored, it can be blown offsite. Additionally, the labor required to cover large areas can make this method prohibitive. However, restoration sites are typically relatively small and hand application of straw mulch could help meet immediate erosion control needs.
- Rolled Erosion Control Products (SS-7) – These are products like geotextile blankets, plastic covers, erosion control blankets, netting, and mats. They are provided in rolls and are used to protect exposed soils from water and wind erosion. They can be used on their own, or in conjunction with other measures such as mulching or revegetation. There are a wide array of products within this category of materials. Most of them are pervious to water, biodegradable, and readily available. Plastic covers can be used for those areas where it is necessary to completely prevent water from reaching the soil.

Regardless of the measure to be installed, they need to be anchored to the ground with large staples.

- Wood Mulch (SS-8) – Wood mulching is the application of chipped wood products to the soil surface to prevent wind and water generated erosion. Wood mulch helps prevent erosion by increasing infiltration and thereby decreasing runoff. Additionally, it can help retain moisture thereby reducing irrigation needs. As a drawback, it probably should not be applied to steeper slopes, greater than 1:3 (vertical : horizontal), because it has a tendency to move downslope. Also, because it typically is installed by hand, substantial amounts of labor may be required.
- Silt Fences (SC-1) Silt fences are commonly made of a permeable geotextile fabric that is attached to stakes and installed along the contours of a slope. The bottom of a silt fence is typically trenched into the soil to create a complete barrier. The fence is intended to intercept and reduce the velocity of sediment-laden sheet flow
- Fiber Rolls (SC-5) – Fiber rolls are comprised of wood, straw, or coconut fibers that have been compacted and rolled into a long tube shape. These are then installed along the contour of a slope and held in place by stakes. They may be slightly trenched into the soil to help intercept sediment-laden sheet flow. Fiber rolls may also be installed around inlets of storm drains and culverts to help control release of sediment.

The California Stormwater Quality Association (CASQA) has assembled a set of stormwater best management practice handbooks for different types of activities: construction, new development and redevelopment, municipal, and industrial and commercial. The manual that provides the most pertinent BMPs for the work SFRPD conducts within the Natural Areas is the *Stormwater Best Management Practice Handbook, Construction* (CASQA 2003). This manual is one of the standard documents used in the preparation of stormwater pollution prevention plans for all major construction projects. In general, the BMPs that could be used in relation to restoration projects and potential erosion issues include straw mulch (EC-6), geotextiles and mats (EC-7), and wood mulching (EC-8). Additionally, the measures identified as sediment control BMPs that could apply include silt fence (SE-1), fiber rolls, (SE-5), and straw bale barrier (SE-9). These measures are similar to those described above in the Caltrans BMPs. The straw bale barrier BMP involves the placement of straw bales on contour through a project site. These bales are then staked in place allowing them to intercept sheet flow, thereby slowing the movement of water and allowing sediments to be deposited onsite. Straw bale barriers can be especially useful in areas where there a substantial amount of water or sediment may move during rain events because they are taller and sturdier than fiber rolls and do not overtop as quickly. Also, they are relatively easy to install and maintain.

A third BMP source is the CDFG *Salmonid Stream Restoration Manual* (Flosi et al. 1998). This document is the standard reference for restoration work to be conducted within a stream. It contains a multitude of restoration design elements, from instream log structures, weirs, check dams, to brush boxes, willow wattling, and erosion control mattresses made from brush.

Most of the measures within this document pertain specifically to instream situations, of which there are very few within the Natural Areas (Islais Creek in Glen Canyon). However, some measures may be easily adapted to upland uses.

PATHOGEN CONTROL

The spread of pathogens from one area to another is possible through a variety of means. Infected plants obtained from a nursery can transmit infections to healthy plants when they are planted. Personal equipment, tools, and vehicles used at an infected site and then used in an area of healthy plants without first subjecting this material to some sort of disinfection process can result in the release of pathogens into an otherwise healthy site. One of the more recent diseases of concern has been Sudden Oak Death, now found in most coastal California counties from Humboldt to Monterey, including San Francisco County. In addition to oak trees, 35 other plant species are susceptible to the pathogen that causes this disease, *Phytophthora ramorum* (COMTF 2004). Precaution should be taken when work is being conducted in a known site for sudden oak death. According to the California Oak Mortality Task Force as a precaution, tools should be cleaned and disinfected after use on confirmed or suspected infested trees. Additionally, tools should be sanitized before being used on healthy trees. Vehicles should be cleaned of mud, dirt, leaves and other woody debris before leaving an infected area. Tools and clothing should be disinfected with either Lysol® spray, 70 percent or greater alcohol, or chlorine bleach (1 part bleach to 9 parts water) (COMTF 2004). In addition to helping to prevent the spread of Sudden Oak Death, these standard measures will help prevent the spread of other pathogens that not only can affect plants, but those that infect amphibians.

Similar measures could be applied to all aquatic sampling, restoration, or monitoring activities to prevent pathogen spread (USFWS 2003). Essentially, all dirt and debris (including snails, mud, plant material, and algae) should be removed from any surface that has come in contact with the potentially infected water before leaving each study site. Equipment should be scrubbed with a bleach solution, 70 percent ethanol, QUAT 128 (quaternary ammonium at a 1:60 dilution), or a 6 percent sodium hypochlorite 3 solution. All equipment should be rinsed with clean water before being re-introduced to a new site. If a site is known or suspected to contain infected organisms, disposable gloves should be worn and changed before moving between sites. All used cleaning materials should be properly disposed of and cleaning should not occur in the immediate vicinity of a wetland should be avoided.

WEST NILE VIRUS

First detected in the United States in 1999, West Nile virus (WNV) is a mosquito-borne disease that is common in Africa, west Asia and the Middle East. In 2004, there were a total

of 829 WNV human infections, from 23 counties in California. West Nile virus activity has been detected in all counties, but there have been no cases reported from San Francisco (DHS 2005). Although it can be fatal to birds (and even humans), most of the people infected with WNV do not exhibit any symptoms. The San Francisco Health Department currently participates in the statewide IPM program targeting WNV. In Natural Areas, two types of BMPs are recommended:

1. Staff should be provided education regarding the most effective way to avoid contracting WNV, which is to not get bitten by mosquitoes. Clothing such as long pants, long-sleeved shirts, and application of a mosquito repellent may all be helpful in this regard. Volunteers and site stewards working with the program should also be informed.
2. Some Natural Areas contain small water features such as abandoned tires and other refuse that holds water. These features could provide breeding habitat for mosquitoes. At times it may be feasible to remove the water from these areas or to treat the features with BT (*Bacillus thuringiensis israeliensis*), a safe and ready to use biocontrol treatment for mosquitoes. In other cases, removal of water cannot occur without damaging a sensitive resource.