

Agenda Item No. 7B

Master Plan for George Washington Park

City of Pacific Grove

**Compiled by the Natural Resources Committee
& City Forester, Frank Ono**

July - 1999

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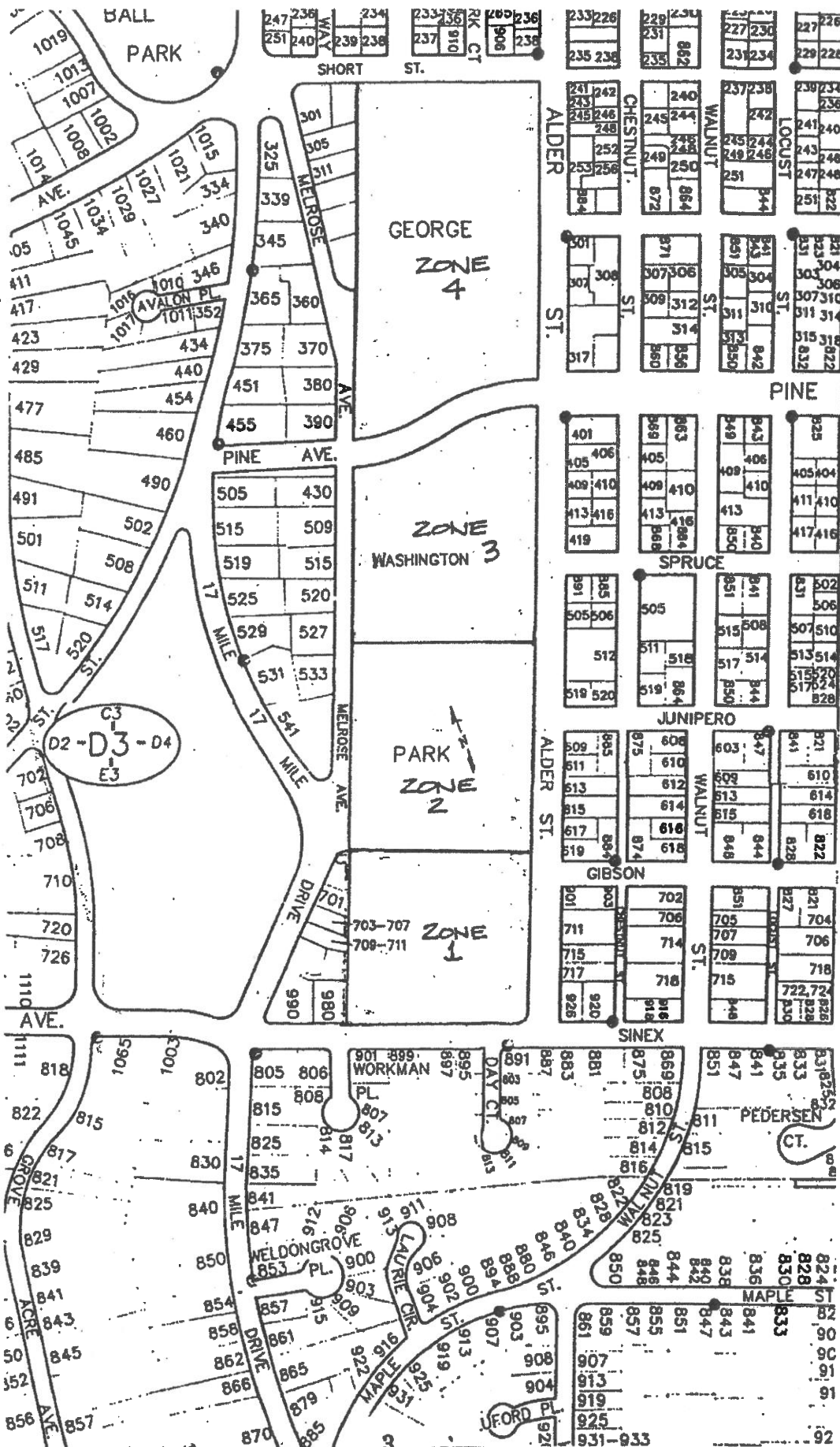
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Introduction

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BACKGROUND

George Washington Park (GWP) consists of a natural forested area of 20 acres located in the west central portion of Pacific Grove on the Monterey Peninsula (36° 30' latitude, 121° 50' longitude). It is six blocks long, roughly north and south, and has varying widths which average close to two city blocks. It is bounded on the north by Short Street, on the east by Alder Street, on the south by Sinex Avenue, and on the west by Melrose Street in places and in other places by private property which fronts on Melrose Street. Only one road, Pine Avenue, crosses through the park. It is located approximately one-third of the distance south of the north boundary. To facilitate recreation, accessibility and resource management discussions, the park has been divided into four zones (see map on page 1):

Zone 1 is the southernmost portion of the park and encompasses the approximately 4 acre day use area managed by the Recreation Department as a high use recreation area. It includes restrooms, picnic grounds with both single and multiple user grills, a ball field and snack bar that is used in conjunction with ball games.

Zone 2 stretches from the ball field to the Southern boundary of the traditional butterfly "Cluster Site". This area is a ravine with steep user defined trails. It should be kept in a natural state to provide a transition zone from the active high use recreation area to the natural forest areas of the other zones.

Zone 3 begins at the top of the ravine, extends to Pine Ave and encompasses the historical monarch butterfly "Cluster Site". It is primarily native forest and should be managed to preserve its value as monarch habitat while at the same time accommodating visitors drawn to the Park to witness the overwintering butterflies.

Zone 4 is the northern portion of the Park which stretches from Pine Ave. to Short Street. We should encourage only passive recreation use in this area so as to sustain its remaining native forest and resident wildlife and provide visitors with a quiet, natural experience unavailable in the other more highly used zones.

A number of native birds, squirrels and other mammals live in the park. The Park is located in the oldest known area for monarch overwintering in California. Natural vegetation consists principally of Monterey pines, Coast live oaks and a number of other species of trees, shrubs, poison oak, and some flowers and native grasses. In some places the forest canopy is closed and there are open spaces under the trees and very few shrubs. In other places where the forest canopy is open, there are a good many shrubs and thicket areas which are difficult to walk through. Scattered throughout the park are a number of standing dead trees. The City recognizes the value of these trees as wildlife habitat and the City Forester will carefully consider their removal following the guidelines of the attached document, Hazard Tree Risk Management for the City of Pacific Grove

The objectives of the management of this park must be to carry out the purposes for which GWP was established. Management of the area must be carried out in such a way that its pleasures are preserved and enhanced, and that its features are conserved and preserved for the benefit and enjoyment of present and future generations; recognizing at the same time, that this 20-acre park with its included day use area is too small an area for maintaining unaltered forest conditions.

PARK HISTORY

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"The natural history of the Washington Park forest parallels that of the other remaining forested portions of the Monterey Peninsula. The forest had been subjected to hundreds of years of constant disturbance from various human activities. Although the native Costanoan people regularly ran fire through this area, it was during the Spanish era that much of the forest was converted to open range for grazing cattle. Since grassland and browse species are not important in the terrestrial ecosystem at Washington Park, grazing impact was probably light and the forest recovered. In about 1850 the forest was logged; the area burned one or more times and then was used for cattle grazing again. With the exception of a few oak trees, most of the [marketable] trees were removed during this time.

"Few, if any, fires occurred in the area subsequent to logging and the burning that shortly followed. Cattle grazing effectively reduced fire potential in the area until they were removed sometime prior to 1900. By then, the area supported scattered 50-year-old pines that had become established in the ashes following earlier logging. Pine and oak seedlings became widely established after the cattle were removed. Today these pines, together with an expanding understory of oak trees, comprise the Washington Park forest.

"The city purchased the pine forest land comprising Washington Park from Del Monte Properties Company in 1925 for ten dollars. Although there were no deed restrictions on the use of the property, the city used it as a park, and it was known as 'Municipal Park,' 'Forest Park,' and 'George Washington Park.' Over the years, there was talk about using the property for purposes such as a trail camp, a campground, or business. Pacific Grove citizens have long supported its use as a park. In 1948, the voters of Pacific Grove passed an initiative ordinance to limit the use of the property to a recreational park. The City of Pacific Grove now manages Washington Park for visitor use and its natural resources."¹

It is the City of Pacific Grove's objective to protect and enhance Washington Park's natural resources. If the declining forest stand of Washington Park remains unmanaged, the Monterey pines, and the monarch habitat along with them, will continue to deteriorate.

RELATIONSHIP TO OTHER DOCUMENTS

One of the principal documents used in creating portions of this master plan is the Conceptual Plan for the Conservation and Management Program for [George] Washington Park, (CPCMPWP) published by The Monarch Project (an endeavor of the Xerces Society, a non-profit group dedicated to the conservation of rare invertebrates and their habitats), in February, 1990. The report was accepted by the City in 1990, and has formed the basis for the past decade of management decisions governing the park's natural resources. That document should be used in conjunction with this current management plan for in-depth understanding of the topics excerpted in this plan within the section entitled Environmental Considerations. A complete copy of the CPCMPWP is available at the Department of Public Works.

Also referenced in this plan are the City's Integrated Pest Management Plan and Hazard Tree Management Plan, both of which are on file in the Department of Public Works office.

¹ The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, page 6.

Goals and Objectives

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The following goals and objectives are intended to provide guidance for future conservation and management of George Washington Park. These goals should be implemented as feasible and as funding is available.

GOAL 1: RETAIN AND ENHANCE THE EXISTING CHARACTER OF THE PARK.

Maintain four distinct management zones within the park. (These zones are illustrated in the map on page 1).

Zone 1 covers the southern-most portion of the Park and encompasses an area of approximately 4 acres which is managed by the Recreation Department as a high-use, daytime recreation area. Maintain existing day use area without expansion.

Zone 2 is a broad ravine which covers the area from the ball field to the southern boundary of the historic Monarch butterfly habitat. It is primarily native forest of predominately mixed Monterey pine and Coast live oaks and contains steep user-defined trails along the northern hillside leading to the butterfly habitat.

Zone 3 begins at the top of the ravine and extends northward to Pine Avenue. It encompasses the historical Monarch butterfly habitat including the "cluster site". It is primarily native forest predominantly comprised of Monterey pine and Coast live oak.

Zone 4 covers the northern portion of the park between Pine Avenue and Short Street and is also a primarily native forest. While it contains a mix of tree species, principally Monterey pine and California live oak, the live oak are the most dominant in number.

GOAL 2: PROTECT PARK RESOURCES

1. Achieve a balance between maximizing the protection of valuable park resources and maximizing public enjoyment of the park.
2. Restore and enhance park resources to a healthy state to ensure the aesthetic enjoyment and protection of habitat areas and forest resources.
3. Protect, restore and enhance environmentally sensitive habitat areas.
4. Preserve and enhance the existing park environment to protect forest and recreational resources.
5. Retain natural land forms to preserve scenic and habitat values where feasible.
6. Install protective barriers where necessary to protect, preserve and enhance park resources.

GOAL 3: PROTECT AND ENHANCE THE VISUAL QUALITY AND APPEARANCE OF THE PARK

1. Protect and enhance the scenic and visual quality of the park by promoting activities which provide for proper preservation, restoration and maintenance of the forest and recreation facilities.
2. Protect and enhance the natural character of the park by coordinating the use of appropriate landscape materials.
3. Assure that the design and materials of such items as signs, benches and trash containers are appropriate to the character of the park area in which they are located.
4. Enhance, preserve and restore the natural conditions of the historic Monarch butterfly habitat and other forested areas of the park.
5. Allow new signs only as necessary for education, public safety and/or environmental protection. Encourage the use of graphic symbols for the convenience and safety of non-English speaking visitors.

GOAL 4: PROMOTE A BARRIER-FREE PARK

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1. Maximize opportunities to provide barrier-free accessways and viewing areas for people with limited mobility.
2. Provide and clearly mark parking areas to accommodate people with limited mobility.
3. Maintain trails suitable for persons with disabilities, as defined in the Americans with Disabilities Act (ADA), where reasonable and feasible.
4. Where feasible, grade trail improvements according to ADA standards to accommodate visually or mobility impaired persons.
5. Integrate accessibility into the overall design program to ensure that the components work together, for example, to ensure safe and comfortable movement between parking and trails. An accessible parking space loses its value if the trail and viewing area are not barrier free, and vice versa.
6. Provide representative sections of the park experience which are entirely accessible and user friendly, recognizing that not all portions of the park can safely and feasibly be made accessible and that access improvements should be sensitive to the natural character and scenic qualities of the park.
7. Provide benches that are wide enough and placed at the appropriate height to accommodate the placement of a wheelchair next to the bench or the transfer of a wheelchair user to the bench.
8. Assure that signs are designed, and facilities are appropriately signed, to accommodate the visually impaired by using large print, easy-to-read fonts, delineated surfaces, simple messages and maps where necessary.
9. Prepare and distribute a handout which would include a map of the entire park that shows ADA access points, viewing areas, parking spaces, grades of streets and trails, placement of benches and trash cans. For the visually impaired, prepare a large print version and/or audio tapes.

Environmental Considerations

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"Monterey pine (*Pinus radiata* D. Don) occurs naturally along the coast of mainland California in three disjunct populations: Ano Nuevo, Monterey, and Cambria. There are also two island populations, on the Cedros and Guadalupe Islands off the coast of Baja California... The largest Monterey pine stand occurs on and adjacent to the Monterey Peninsula, covering about 4,000 hectares...

"The health and vigor of different individual Monterey pine stands on the Monterey Peninsula vary from one another, depending on such environmental factors as soil type, soil depth, exposure, distance from the coast, rainfall, pathogens, and degree of human disturbance... In the short-term, however, each stand fluctuates, as individual trees or groups of trees die and are replaced by their seedlings. In this process it may appear to the uninformed observer that the forests are declining when in fact they are surviving, but not at a high level of health and vigor. A key to long-term vigorous survival is the forest's ability to regenerate itself, and it is here that human influence can impact the continued survival of the Monterey pine forest."²

The following topics are thoroughly explained and discussed in The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990. This report was accepted by the City Council in 1990, and forms the basis for the past decade of management decisions governing the park's natural resources. That document should be used in conjunction with this current management plan for in-depth understanding of the following topics, which have been excerpted below:

TERRAIN AND VEGETATION

GWP "slopes gently at approximately two to five percent towards the west. Soils are generally Tangair fine sand with some Narlon sandy loam. Many Pacific Grove residents and visitors use the park, as evidenced by the labyrinthine matrix of paths throughout the forest. The monarch roosting sites in the park attract a plethora of visitors every year, who come to view the phenomenon of clustering monarchs. That this unique forest is actually suffering from overuse is demonstrated by the exposed tree roots along many of the beaten paths. Uncontrolled, indiscriminate use of the park by visitors is damaging the root systems of the pines, inducing stress and making the pines susceptible to bark beetle infestation and other pests.

"The vegetated, gently sloping areas pose no erosion problems. However, the prolific trail network throughout the park shows exposed bare soil and tree roots in many areas. This exposure suggests that erosion presents a potential hazard to tree health and vigor. Drainage from Junipero and Gibson Avenues used to be heavy, and a drainline was installed in 1998 running from Alder Street to Melrose Avenue to capture surface water and run it underground.

"The forest of Washington Park is dominated by a mature overstory of Monterey pine and a dense understory of coast live oak. Other native understory species include a variety of shrub and herbaceous plants... (See Appendix C for Plant Species List.)

"The native shrub and herbaceous layer once spread more widely and continuously throughout Washington Park than it now does. Native species are trampled by pedestrian foot traffic, and are seriously threatened by the spread of invasive exotic vegetation, particularly the annual grasses, rattlesnake grass (*Briza major*) and riggut (*Bromus diandrus*). These grasses grow rapidly during the rainy season and by April form a dense cover more than two feet high that inhibits the establishment of slower growing native species, including Monterey pine seedlings. The dense understory of exotic annual species is the prime factor prohibiting pine seedling establishment. The diverse array of native understory species are also unable to compete against the invasive grasses and in time are displaced.

"Soils, drainage and climatic factors make Washington Park an ideal site for Monterey pine as evidenced by the landmark trees, which make up about 20 percent of the total number of Monterey pines. The pine and coast live oak form a mature, even-aged stand, meaning that the dominant trees were established at about the same time. The site is currently stocked at close to 100 percent, with occasional openings in the tree canopies. The mature pine canopy is open and the oaks exhibit a

² The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, page 5.

resplendent, closed canopy. The forest provides wildlife habitat, especially to cavity-nesting birds utilizing snags (standing dead trees).

“Several pines of unknown origin have been planted over the years in the picnic area and around the park perimeter along Alder Street, Short Street, and Pine Avenue... The City should examine the possibility of removing and replacing them with native Monterey pine or another native species... Monterey pines outside the park, particularly on the western and northern sides, serve to buffer the park’s forest from direct exposure to the wind and other climatic influences. Since these trees are gradually being cut down (and are not commonly replaced) the health of the Washington Park forest and its suitability as monarch habitat may be adversely affected. Regeneration, critical to continuation of short-lived pine species, is sparse to non-existent. The lack of new growth is a major contributor to the decline of the monarch overwintering habitat.

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“The health of the pines in Washington Park is in serious decline. Approximately 10 per cent of the pines are dead or dying and those remaining pines are under considerable stress and declining. [NOTE: In the nine years since the Monarch Project report, pitch canker has become rampant on the Monterey Peninsula. Estimates of the current (1999) rate of infection range from 80-90%: Katy Travaille, Natural Resources Committee] The oaks, on the other hand, can be described as “thrifty” at this point in time, that is, in good but not vigorous health, and not obviously declining. If the present trend continues uninterrupted, the coast live oak will be the dominate tree in the park in about 20 years. However, if the soil compaction problem is left unaddressed, the quality of the environment for supporting the oaks would degrade as well.”³

FOREST SUCCESSION

“The Washington Park forest is going through a successional change in which the pines are old and dying out and the oaks are filling in. Coast live oak has two characteristics that give it a competitive advantage over Monterey pine. First, it has a long life span of 150-300 years, whereas the Monterey pine, with an average life of 80 to 100 years, is short-lived. Second, the coast live oak reproduces well in shade, whereas shade suppresses Monterey pine regeneration. In the absence of any type of disturbance to control the growth of the oak, the pine forest will generally move toward an oak forest climax. Under natural conditions where intense wildfires periodically kill and thin out mature oaks, and where browsing activity of deer suppress the growth of young oaks, the pine forest can maintain itself indefinitely. But since fire has essentially been removed as an ecological force and deer rarely use the park, there is no longer a controlling factor in the successional process and therefore the forest would naturally, in time, culminate as oak woodland.

“The situation in Washington Park recalls the problems experienced in Sequoia National Park where overuse resulted in serious decline of the giant sequoias. Washington Park is covered by a labyrinthine, uncontrolled trail system and excessive visitor use causes severe soil compaction and soil erosion which has exposed roots in some areas. Soil compaction stresses the tree and invites pathogen infestation... The stressed pines are vulnerable to several biological problems and the beetle infestation is of epidemic proportions and requires immediate attention.”⁴

The ravages of the rampant spread of pitch canker throughout the pine forest of the Monterey Peninsula is very apparent in Washington Park. Unless something is done to arrest the progress of the disease and control the invasive exotics which inhibit the regeneration of the pine forest, the park will continue in its succession of pine-to-oak-woodland, and the overwintering population of monarch butterflies will be lost.

“Fortunately, the same mitigation measures employed at Sequoia National Park are transferable to this site. The soil compaction must be treated and any further damage avoided by establishing a controlled trail system. This trail system will be designed to carry a significant number of park visitors while minimizing soil compaction and root damage. Furthermore, because regeneration is woefully lacking, encouragement of natural regeneration (seeds established on site) and artificial regeneration (seeds gathered on site and propagated elsewhere, then planted) are recommended to ensure continuance of the stand.

³ The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, pages 7 and 8.

⁴ The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, pages 8.

MONARCH HABITAT CHARACTERISTICS

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"In selecting overwintering habitats, migrant monarch butterflies in the fall search out areas near the California coastline characterized by a very special subset of climatic variables that provide them protection from desiccation (drying out), starvation, and freezing while at the same time providing enough sunny days for them to warm up sufficiently to be able to fly, mate, and search for nearby nectar supplies. The proper set of conditions are known as the "microclimatic envelope.

"Proximity to the Pacific Ocean protects the butterflies from severe freezing and provides high humidity; tree cover and topography protect them from wind exposure; and a south and/or westerly exposure of the grove provides them access to direct rays of the sun for thermoregulation, i.e. orienting to the direct rays of the sun that allows them to warm rapidly and attain flight threshold on cool winter days. It is therefore extremely important that microclimatic data be gathered in Washington Park while the butterflies are still selecting the area in order to maintain and enhance the microclimatic envelope through future management of the site. The single most important basis for the long-term survival of Washington Park's monarch habitat is accurate biological information.

"At Washington Park, monarch butterflies aggregate in the northeast portion of the southern rectangle of the park. Here the butterflies form clusters each year in an area approximately 700 square meters within the forest of Monterey pine. The forest is dominated by the pines and includes many old trees of about 30 meters in height with a predominance of smaller, mature trees at approximately 20 meters in height. Coast live oaks with a height of up to approximately 10 meters are also abundant. Monarchs cluster only on the smaller, mature trees and do not use the coast live oaks or the tallest pines. The tallest pines are close to senescence, and will die off soon, as eventually will the younger ones they now cluster on. As noted, there is little or no regeneration of the pines from seeds. Hence the importance of planting new trees.

"To the south of the overwintering aggregations, the pines thin out considerably. The oaks and pines in that area once bore larger amounts of epiphytic lichen, or lichen living in the air. The combination of a thinner stand of trees and less lichen suggests that the overwintering habitat is subjected to greater winds now than in the past, a significant and growing deterrent to overwintering. [NOTE: As of the 1999 writing of this Management Plan, it appears that the microclimatic conditions that supported GWP's overwintering butterflies have deteriorated to the point that the forest can no longer support large quantities of overwintering monarchs. We have included this segment of the CPCMPWP to encourage management which will, in time, bring back the forest to conditions which can sustain traditional monarch butterfly populations: Katy Travaille, Natural Resources Committee]

The Overstory Canopy: Cover And Insulation

"Research in Mexico has established that overwintering forest density at 250-800 trees per hectare and basal areas of 25-85 meters squared per hectare are most effective for monarch overwintering. These figures suggest a mature, climax forest community with active regeneration.

"The overstory canopy in monarch overwintering habitats should be predominantly closed and formed by mature, reproductive trees at heights of approximately 10 to 30 meters. A closed canopy reduces temperature loss at night and insulates the forest from excessive heating during the day. Temperatures within closed canopy forests are significantly warmer at night and cooler during the day than those in adjacent clearings or open canopy forests. Closed canopy forests are also more humid and retain moisture better than open forests.

"The closed canopy shields the interior of the overwintering habitat from direct sunlight and makes excessive monarch movement less necessary and less likely. Monarchs must establish an energy balance between conserving sufficient stored fat as an energy source to power movements that may be necessary to escape excessively cold ground temperatures and predators. An excessively open canopy makes it more likely that monarchs will be (a) dislodged from their clusters during storms; (b) subject to greater predation from birds and mice, (c) forced to expend valuable fat stores to fuel movement back to clusters, and (d) subject to involuntarily increased body temperatures, by exposure to direct sunlight that also expends fat reserves."⁵

⁵ The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, pages 9 and 10.

The Understory Vegetation: Sustenance And Shelter

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"The understory is a second, too frequently underrated, factor in creating a successful overwintering habitat. The understory should include a diverse collection of plants which have varying heights, so that the plant cover is somewhat redundant of the protection provided by larger trees. Thus, as the large trees age and their lower branches become more barren, the understory still provides shelter and protection from winds. The mingling of tall pine and lower oak in Washington Park provides a good example of this, but it needs to be maintained and enhanced. However, in Washington Park there is a paucity of lower ground vegetation in the monarch habitat.

"Monarchs use understory vegetation within and near overwintering habitat as a substrate to crawl up onto from the ground and sometimes as a source of flower nectar. The understory also helps shelter clustered monarchs from excessive winds. Understory plants tend to reduce heat loss and, by providing insulation on the ground, reduce excessive warming.

"Overall, the understory helps to regulate the microclimate, increases humidity and makes water available to monarchs through condensation. Monarchs need to escape from the ground onto understory vegetation and tree trunks in order to avoid mouse predation and possible freezing temperatures from cold air drainage. Where visitors to monarch overwintering sites are numerous, understory vegetation also helps monarchs avoid being trampled to death and limits visitor access. Overall, the understory at Washington Park is clearly insufficient and unable to fulfill these basic requirements for overwintering monarchs.

PROBLEMS IN FOREST HEALTH

"Currently the pine stand in Washington Park is rapidly declining with about 10 percent of the trees dead or dying. At the current rate of decline, the pine stand will essentially be dead in ten to twenty years. The long term recovery of the pine stand is dependent on the regeneration of the pines through seedling establishment and a return to health of some of the large trees. The current obstacles to regeneration are the dense understory of primarily weedy species and the serious problem of soil compaction. The current seed supply, which is adequate, falls and germinates in the weedy understory and on the compacted soil. The seedlings die in the understory due to competition with the weeds and on the compacted soils due to lack of root penetration.

Soil Compaction

"There are two primary sources of soil compaction in Washington Park: visitor use and the impact of rain on bare mineral soil. Pedestrian and bicycle traffic tend to create paths of bare mineral soil with a heavily compacted layer extending down through the soil profile for several inches. The sheer number of annual visitors in Washington Park and the lack of pedestrian path control ensures that significant soil compaction will continue to occur. Once a path has lost its cover of organic matter, raindrops striking the soil tend to increase compaction and reduce aeration of the soil even further.

"Soil compaction causes a range of problems in the park, including loss of soil aeration, forest disease and insect problems, and surface erosion... .

"Rainwater doesn't sufficiently penetrate compacted soils, leading to an additional set of problems. Instead of entering the compacted soil, rainwater collects on the surface and flows away downhill causing surface erosion. The trees suffer from a lack of soil moisture since insufficient rain water penetrates the compacted soil to replace the water the trees utilize for growth. The soil washing away in surface erosion exposes tree roots, as can be seen in Washington Park. Soil compaction has stressed the pines and invited a beetle infestation of epidemic proportions."⁶

⁶ The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, pages 10 and 11.

Pitch Canker

In 1990 the authors of Monarch Project Report said that though pitch canker had been identified 40 miles north of Pacific Grove in Santa Cruz County, they saw no evidence of the disease in GWP. Since that time pitch canker has spread rampantly throughout the Peninsula, and has become the most significant factor in the forest's decline.

Pitch canker is caused by a fungus (*Fusarium subglutinans forma specialis pini*). It was first identified in California in 1986, and has now spread throughout large areas of coastal California. It is spread by insects that feed and reproduce on pines. This includes the Monterey pine cone beetle (*Conophthorus radiatae*) and several species of both twig beetles (*Pityophthorus spp.*) and engraver beetles (*Ips spp.*), all of which are native to California.

"The infections which result from feeding by twig and cone beetles lead to the girdling of young branches. The death of these infected branches weakens the tree and provides substrate suitable for breeding by twig beetles. Beetles emerging from infected branches commonly carry the pathogen and may proceed to establish new infections. Engraver beetles can introduce the pathogen into larger branches and ultimately the bole or the main trunk of the tree. Bole cankers further weaken the tree and render it more prone to engraver beetle attacks. Death of the affected tree often follows, which in turn enhances the reproductive opportunities for both *Ips* and *Pityophthorus* species.

"Although it is most conspicuous as a disease of mature trees, pitch canker can also affect seeds and seedlings. Seeds collected in pitch canker-infested areas commonly carry the pathogen, even where they originate from cones on unaffected branches. Infected seeds may fail to germinate or germinate to produce infected seedlings. Infected seedlings may die shortly after germination or survive without obvious symptoms for several months. Consequently, both seed and seedlings can serve as vehicles for dispersal of the pathogen... Moreover, we have confirmed the ability of *F. s. pini* to survive in litter and in soil. Consequently, the potential for pitch canker to contribute to seeding mortality will continue to increase concomitantly with the incidence of disease in mature trees, which constitute the principal source of the inoculum found on and in the soil..."

"The occurrence of fire would enhance the prospects for regeneration. In addition to opening Monterey pine's serotinous cones and freeing space for the establishment of younger trees, fire sanitizes the top layer of soil, greatly reducing the levels of fungal inoculum and thereby minimizing pitch canker-induced seedling mortality. Fire, and or alternative treatment that mimics the effects of fire may enhance regeneration by reducing *F.s.pini* inoculum during the critical years when young trees are most susceptible to the disease."

All wood from downed trees or hazard trees felled in the park should be considered to harbor the pitch canker fungus. In order to slow the spread of the disease, Pacific Grove citizens should be discouraged from gathering wood and storing it next to living pine trees or transporting it to uninfected areas.

There is presently no cure for this devastating disease. There is some evidence that the occurrence of naturally resistant genotypes within the native pine population may offer the Monterey pine a chance to successfully adapt to the pitch canker pathogen. Though the use of fire as a management tool for GWP has been dismissed in the past as too dangerous and drastic, it may be the only way to preserve the forest in GWP. Studies are currently being conducted on the use of small controlled burns as a regeneration tool in the pine forests of Pebble Beach and elsewhere in local State Parks. Based on the success of these studies, NRC encourages the consideration of small mosaic burns in the park to regenerate the pine forest and enhance pitch canker-resistance.

⁷ Thomas R. Gordon, Karen R. Wikler, Andrew J Storer, and David L. Wood, Fremontia: A Journal of the California Native Plant Society, Vol. 25, No.2, April 1997, page 7.

⁸ Thomas R. Gordon, Karen R. Wikler, Andrew J Storer, and David L. Wood, Fremontia: A Journal of the California Native Plant Society, Vol. 25, No.2, April 1997, page 9.

Pest Infestation: Beetles

In Washington Park, two genera of bark beetles are common, *Ips* and *Dendroctonus*. "These beetles primarily attack trees weakened by stress. Stress can be caused by soil compaction, root injury, old age, competition from other trees or weeds, or insufficient water or too little or too much of some other agent. Vigorous healthy pines usually resist beetles by producing abundant amounts of pitch when the beetles try to bore in. The pitch hampers the insects' invasion and impedes their development beneath the bark... Compounded by the old age of the stand, [current] beetle infestation is attributable to several factors, including: 1) root damage from construction activity within and on the perimeter of the park; 2) soil compaction and mechanical injury to roots from increased visitor use of the park, particularly in the area where the butterflies congregate, and from vehicles driven through the park; 3) increased competition for available soil, water, and nutrients by exotic plants; and 4) changes in forest microclimate as a result of deforestation occurring around the periphery of the park.

"Any measures that can be taken to prevent pines from becoming stressed will reduce the likelihood of serious losses from bark beetles. Such measures should include prohibiting or minimizing any activity which would damage tree roots, and reducing soil compaction and preventing reoccurrence of compaction around trees.

"Recognizing that an infestation is in progress and that the forest and, therefore, the monarch butterfly population is vulnerable to severe tree loss, remedial action should be taken soon to control the infestation. Heavily infested trees or dying trees should be promptly removed or debarked.

"Removal of infested bark is the best manual method of beetle population control, and will improve the general health of the forest quickly. The bark, which harbors the beetles, should be removed from standing and fallen dead trees to the greatest extent possible. Both the bark and the fallen dead trees will then be chipped for use as mulch on the designated trail system."⁹

The control of beetles through the use of insecticides is not recommended in GWP as it could adversely affect the monarchs.

Pest Infestation: Other Pathogens

"Western gall rust (*Endocronartium harknessii*) is ubiquitous throughout the Monterey Peninsula and is responsible for deformation and wind breakage of trunks and large branches in mature trees, and significant mortality in small trees. The western gall rust fungus produces round branch and stem galls which eventually girdling the tree (remove strips of bark around its circumference). Trees usually survive branch girdling, however they are eventually killed by stem girdling.

"Another stem disease, [Coastal]dwarf mistletoe (*Arceuthobium [littorum]*) is also widespread over the Monterey population and affects pines of all ages, though primarily those of sapling size. Mistletoe infested trees are weakened and thus become more susceptible to insect attack... .

"Washington Park also contains a large stand of coast live oak, which hosts a common pathogen called oak root fungus (*Armillaria mellea*). It infects the roots of all oak trees in Washington Park. Under normal conditions this fungus is not harmful to the tree. Oaks typically are infected over their lives and remain in balance with the fungus unless the environment changes. Summer irrigation and soil compaction are two of the environmental changes that can promote the fungus infection to the detriment of stand health. If the soil compaction around oak trees in Washington Park is allowed to continue, then the fungus could seriously infect the roots and eventually kill some or many of the oaks. The proposed program taking measures to alleviate and prevent further soil compaction will benefit those oak trees currently affected by it."¹⁰

⁹ The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, page 12.

¹⁰ The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, page 13.

Restricted Activities

Agenda Item No. **7B**

CONCEPT

The concept for listing specific activities to be prohibited within the park on a seasonal or on-going basis is to ensure the continued health of park flora and fauna, particularly the overwintering Monarch butterflies and their remaining historic habitat. Emergency vehicles and emergency maintenance or repairs are excepted from these prohibitions at the City Manager's discretion.

MANAGEMENT GUIDELINES

These guidelines are presented in order to protect the existing park vegetation, and any future restoration, as well as overwintering Monarch butterflies and their historic habitat.

1. Prohibit the use of gasoline-powered equipment in the Monarch butterfly roosting sites while Monarch butterflies are in residence.
2. As asphalt continues to radiate heat after application and heat changes the microclimate within the historic Monarch butterfly roosting site, prohibit asphalt work near historic Monarch butterfly roosting sites within Zone 3.
3. Because soil compaction is detrimental to forest vegetation, prohibit driving of trucks or other heavy equipment into the park within Zones 2, 3, and 4, except in emergencies as determined and sanctioned by the City Manager.
4. Limit the driving of trucks or other heavy equipment into the park within Zone 1 only as needed for repair and maintenance of recreational facilities as determined by the Department of Public Works and the Recreation Director.
5. Since bicycle traffic also contributes to soil compaction and erosion, prohibit bicycle traffic in Zones 2, 3, and 4.

Hazard Tree Management

CONCEPT

Standing dead trees in and of themselves do not necessarily impose significant risk to public safety or property and, along with the dead wood (coarse woody debris) on the forest floor, they form a critical component in the ongoing replenishment of forest soils, and provide food and habitat for a variety of birds, insects, small mammals and other vertebrates.

MANAGEMENT GUIDELINES

1. Periodically inspect trees within the park for risk to public safety or property.
2. In accordance with the City's Hazard Tree Risk Management Plan (HTRM), evaluate trees that are suspected of posing a significant risk using Tree Hazard Evaluation guidelines published by the International Society of Arboriculture. (Reference copies of the HTRM are available from Public Works.)
3. Take remedial action as deemed necessary.

Pest Management and Control of Non-Native Plants

Agenda Item No. 7B

CONCEPT

The City of Pacific Grove General Plan prohibits the unsafe use of chemical pesticides and herbicides and also requires that City personnel using approved pesticides and herbicides be properly trained and licensed for their use. The City's Public Works Department has implemented an Integrated Pest Management Plan (IPM) to best comply with General Plan mandates and to deal with critical decisions concerning pest problems. An IPM is designed to minimize the use of pesticides and herbicides, and implement a balanced program of sound ecological practices to control those pests which occur. Trained personnel identify pests and their symptoms, and consider what interrelation of cultural practices, environmental conditions, biology of plants pests, and beneficial organisms are present before prescribing and administering remedial measures. Those measures may include cultural, mechanical, physical, biological and/or chemical controls.

MANAGEMENT GUIDELINES

1. Prohibit application of biocides and/or herbicides year-round in the historic Monarch butterfly roosting sites within Zone 3.
2. Apply biocides and/or herbicides with known residual effects, prior to September 1 in Zones 1, 2, and 4.
3. During the months when monarch butterflies are in residence, historically from October to April, prohibit application of biocides and/or herbicides anywhere within the park.
4. Remove poison oak around park perimeter and in Zone 1 due to high recreational use in that area. However, as poison oak is a valuable source of food and cover for wildlife and discourages off-trail passage by visitors to the park, control poison oak in all other zones only where it encroaches on authorized trails.
5. In all other dealings with pests found to occur within the Park, including non-native plants such as pampas grass, French broom, ice plant, etc., consult the Integrated Pest Management [Plan] for Use by Public Works Personnel on Pacific Grove's Parks, Open Spaces and Public Facilities and follow the guidelines set out therein. (Reference copies of the IPM are available from Public Works.)

Fire Management

Agenda Item No. **7B**

CONCEPT

"The key to fire management in an urban forest setting is to control the fuel load within the forest and to provide adequate safeguards against the introduction of fire from outside the park."¹²

MANAGEMENT GUIDELINES

The following measures are intended to reduce the risk of a catastrophic fire within the park:

1. Manage understory levels to prevent a localized buildup of dead plant materials.
2. As live understory plants and grasses are valuable to the monarch butterfly habitat, remove only excess dead material and plant rubbish, particularly within Zones 2, 3 and 4.
3. Monitor yearly buildup of live brush.
4. Remove live brush buildup as needed as determined by City Public Works and Fire Department personnel in consultation with a forest ecologist and monarch butterfly experts. Special attention should be given to understory requirements for monarch butterfly habitat.
5. Remove all standing dead trees smaller than six inches in diameter at breast height, and chip for use as mulch on park trails.
6. Mulch open areas as needed to inhibit the growth of weed species.
7. Mow a five to ten foot wide strip in grassy areas along roads to provide protection against fires from cigarettes and similar ignition sources. Mowing should be done once or twice in both the spring and summer and no vegetation other than grasses should be cut.
8. Establish a 30 foot fuel break around the perimeter of the park by removing all dead material (trees, shrubs and grasses) within this area. On pines within the area, remove branches to a height of eight feet about the ground. Live shrubs should be retained.
9. Post signs in the picnic area in Zone 1 prohibiting fires outside of the barbecue pits provided.
10. During times of critical fire danger, City Public Works and Recreation staff, in consultation with City Fire Department personnel, may wish to prohibit smoking and fires of any kind within the park as conditions warrant.
11. If the results of small controlled burns elsewhere on the Peninsula warrant, consider future use of this method to foster reduction of pitch canker and promote natural regeneration of the pine forest within the park. Controlled burns do not have to be done by City personnel. California Division of Forestry will perform controlled burns on private property at no cost; they also accept the liability.

¹² The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, page 24.

Recreation Plan

Agenda Item No. 7B

CONCEPT

To allow active recreation use in the 4.3 acre day use area (Zone 1) in a manner best in keeping with the character of the overall park and community needs, while preserving to the utmost, the natural environment. The park should continue to create the illusion of being as far removed from the urban scene as possible.

MANAGEMENT GUIDELINES

The 4.3 acre day use area (Zone 1) should be an extension of the park proper, and as such, be maintained in as much of a natural state as its intended use will permit.

Priorities

1. The existing day use area should not be expanded.
2. Any trail plan will not interfere with any present or future plan use of this area.
3. Only authorized vehicles will be allowed in the park and all parking shall be on the park perimeter.
4. The approved 1993 4.3 acre drawing shall be used as the site map for future use of the area.
5. All dead limbs and trees which appear to be extremely hazardous should be trimmed or felled and removed. Any tree removed shall be replaced, within one year at the latest, with at least a one gallon tree.
6. All non-indigenous plants and poison oak should be removed.
7. All playground equipment, picnic areas and restrooms shall be maintained in a non-hazardous condition with weekly inspections. Maintenance work shall be provided as necessary.
8. A service club could help with major maintenance at intervals of no more than two years.

ADA Access

Agenda Item No. 7B

CONCEPT

As outlined in the goals for this document, the City of Pacific Grove believes that George Washington Park should be made accessible so that individuals with varying levels of disabilities can enjoy the park's recreational opportunities and natural beauty. Efforts to do so began in 1993 with improvements to the picnic areas and playground in Zone 1. This plan is intended to continue those accessibility improvements without compromising the natural beauty of the park or damaging the fragile ecosystem that supports overwintering monarch butterflies.

MANAGEMENT GUIDELINES

Priorities

The priorities for improving accessibility within the park, as listed below, were drafted by the A.D.A.C.A.C. and approved in January, 1999. The A.D.A.C.A.C. would work with the Recreation and Public Works Departments to:

1. Provide at least one whole access restroom within the park in Zone 1.
2. Provide whole access to the Youth Ball Diamond area in Zone 1.
3. Provide whole access to the Group Picnic area within Zone 1.
4. Provide resources for the development of the Park Master Trails Plan as outlined below.

Trail System Development Review

The Washington Park trail system was developed by the City's Monarch Habitat Restoration, Natural Resources, and Americans with Disabilities Compliance Committees in conjunction with the Recreation Department, Public Works and the City's ADA advisor. We have sought advice and incorporated information from the following government agencies: The Department of Justice's Federal Register, Vol. 56, No 144, (1991), The Recreation Access Advisory Committee's Recommendations for Accessibility Guidelines: Recreational Facilities and Outdoor Developed Areas (1994), The State of California Department of Parks and Recreation's Access to Parks Guidelines (1993), The Pacific Disability and Business Technical Assistance Center, and the California State Community Access Network.

Trail Plan

Accessible trails throughout George Washington Park should follow the specifications provided in the State of California Department of Parks and Recreation's Access to Parks Guidelines. Trails should allow visitors to the park to have reasonable access to its various natural and recreational experiences while also protecting the park's remnant stand of Monterey pine forest and one of California's most significant examples of aboriginal monarch butterfly overwintering habitat.

1. Have the Pacific Grove Recreation Department develop and the Pacific Grove Public Works Department maintain ADA accessible trails, bathrooms and other recreation facilities in the high use recreation area of Zone 1.
2. Sign the trails through Zone 2 as "Most Difficult" since the topography makes development of formal ADA-accessible trails impractical there.
3. Zone 3 is the prime area in which to develop an easily ADA accessible trail and rest area. If the monarchs return to the Park in the future, visitors with (and without) disabilities will be able to find the butterflies easier with less impact on the forest. If the butterflies do not return to over winter in the Park, this area contains a representative sample of native Monterey Pine forest plant and bird species and could be developed as an educational nature trail. The City should strive for a high degree of accessibility here by constructing a boardwalk or lining the trail with logs and building up a firm walking surface with decomposed granite or ADA approved stabilized mulch. Signed Handicapped Parking should be available at the entrance to this trail. Junctions with the natural area cross trails necessitate constructing ramp transitions and would be signed to give visitors the information they need to determine whether they would be able to negotiate alternate

routes. This portion of the trail system should be designed by a qualified engineer who is knowledgeable in accessibility issues and sensitive to the delicate environmental requirements of the butterfly habitat.

4. Keep the trails in Zone 4 in their current natural condition to encourage quiet passive recreation. Create 2 wheelchair accessible curb cuts and trail heads with designated Handicapped Parking, one on Alder Street near the corner of Pine, and the other on Short Street across from Bentley Street. The existing use trail which connects these points is nearly level with only two areas of exposed roots which could be mulched to prevent a tripping hazard. Sign both ends of this trail as having a moderate degree of difficulty.

Agenda Item No. 7B

Fencing

CONCEPT

"Forest entomologist Dr. Clifford P. Ohmart wrote, '...all uses [in natural areas] are simply not compatible in every situation. A given type of natural environment can only sustain so much impact by people, no matter how well-regulated this impact is, before it is affected by it.'

"Washington Park has entertained unrestricted human use for so long that the impacts from it have now seriously degraded the forest and the monarch habitat. The best and only hope that the park and its monarch habitat will survive is if the most important areas are well-protected. The choice now is between completely unrestricted use on the one hand, and the very survival of the forest on the other"¹²

GUIDELINES

The use of eyebolt-and-cables to delineate the main butterfly cluster site has been successful in controlling aimless wandering through the damaged understory. Since its installation, there has been marked improvement in the survival and growth of young restoration plantings. However, maintenance has proved problematic as vandalism has been a recurring problem necessitating repeated repairs by public works. We recommend that a more permanent solution to the problem of habitat degradation be installed.

1. Construct a rustic split rail fence around the park perimeter with openings to the managed trail system.
2. Post signs at entry points informing the public about the need to stay on designated trails to preserve the health of the forest.

¹² The Monarch Project, Conceptual Plan for the Conservation and Management Program for Washington Park, February 1990, page 16.

Revegetation Plan

Agenda Item No. 7B

The following Revegetation Plan (pages 18-23) was prepared by Bruce Cowan in February, 1992, after the 1991 consultation visit by butterfly scientist Dr. Lincoln P. Brower, Dept. of Zoology, University of Florida. It was intended to supplement Dr. Brower's comments and serve as a guideline for the restoration of natural habitat in George Washington Park to encourage recolonization of overwintering monarch butterflies.

EXISTING CONDITIONS

The park contains a stand of aging Monterey pines with most of the foliage at the top. These trees do not provide sufficient windbreak for monarch butterflies. Few young pines are growing under the old trees due to several factors:

- An extended period of fire suppression.
- Excessive shading and root competition from mature trees.
- An understory of coast live oak which may shade out pine seedlings. In many places the oaks are on their way to becoming the dominant tree.
- Groundcovers of mostly introduced weedy annual grasses and other weeds compete excessively with newly germinated pine seedlings and other native plants.

Steps have already been taken to correct some of these factors by planting young pines and creating mulched trails throughout the park.

The native understory vegetation has changed over the years due to intensive use of the park, including trampling, mowing to reduce fire hazard, and deliberate or accidental introduction of a number of exotic species, such as genista or French broom (*Genista monpessularis*), annual grasses--mainly ripgut (*Bromus diandrus*), rattlesnake grass (*Briza maxima*), foxtail (*Hordeum murinum* ssp. *loporinum*), and ryegrass (*Lolium* spp.); ornamental plants such as English ivy (*Hedera helix*), montbretia (*Tritonia*), and yellow oxalis or Bermuda buttercup (*Oxalis pescaprae*).

Some of the tougher native species, including poison oak (*Toxicodendron diversilobum*), blackberry (*Rubus ursinus*) and hedge nettle (*Stachys bullata*) still remain in the park. Many of the other native species have either become scarce or have been eliminated.

The native understory that once existed can be estimated by comparing Washington Park with Rip Van Winkle Park, which is much less disturbed. In addition to poison oak, blackberry and hedge nettle, the groundcover in Rip Van Winkle Park contains a number of fragile species, including creeping snowberry (*Symphoricarpos mollis*), Douglas iris (*Iris douglasiana*), sticky monkey flower (*Mimulus aurantiacus*), yerba buena (*Satureja douglasii*), wood strawberry (*Fragaria vesca*) and milkmaids (*Cardamine californica*). These plants are highly subject to trampling, and they do not compete well with weedy annual grasses. Most of the grasses in Rip Van Winkle Park are native species, except near the edges.

Larger shrubs in Rip Van Winkle Park include blueblossom ceanothus (*Ceanothus thyrsiflorus*), toyon (*Heteromeles arbutifolia*), coffeeberry (*Rhamnus californica*), huckleberry (*Vaccinium ovatum*), currant (*Ribes malvaceum*) and pink flowering currant (*Ribes sanguinem glutinosum*). A few coffeeberry and ceanothus remain in Washington Park, but the ceanothus are dying out due to aging and excessive shading. This species reseeds itself mainly after fires.

Both species of *Ribes* are probably less abundant in Rip Van Winkle Park than they once were, partly due to heavy deer browsing. They no longer occur naturally in Washington Park; however, they are extremely important species as nectar source for monarch butterflies and overwintering Anna's hummingbirds, being the only native shrubs that bloom abundantly during the winter months. Chaparral currant blooms mainly from November to February, and pink flowering currant blooms abundantly from mid January to mid March. Monarch butterflies and Anna's hummingbirds are frequently observed feeding on these shrubs. [NOTE: Since Bruce Cowan's Revegetation Plan was written in 1992, both species of currants have been planted in the butterfly roosting area and have survived deer browsing to mature and flower; Katy Travaille, Natural Resources Committee.]

Blue blossom ceanothus blooms in early March, and provides a possible nectar source for butterflies at the end of their overwintering period.

Shaggy bark manzanita (*Archostaphylos tomentosa*) also blooms in late winter, and may provide some food source. However, most of the habitats in Washington Park are presently too shady for this species to flourish.

Agenda Item No. 7B

CONCEPT

Restoration of habitat in Washington Park should include four objectives:

- 1) Restore the overall health of the forest.
- 2) Retain the natural character of the park.
- 3) Recreate habitat more favorable to monarch butterflies.
- 4) Provide for passive recreational use only, except in designated locations such as picnic areas and the baseball field.

To retain the natural character of the park, exotic species--including weeds--should be eliminated as much as feasible, and only native species should be planted.

To recreate butterfly habitat, native plants that provide nectar sources should be planted extensively. Also, meadows of low-growing native grass should be planted in the middle of the "magic circles" (see Brower report) for moisture. Pine trees should be planted to provide windbreaks, but in a way that allows for sunny openings. Oaks may need to be thinned.

To provide for passive recreational use, designated trails should be installed, and native groundcovers protected from trampling.

MANAGEMENT GUIDELINES

Eradicating Non-Native Plants

Though different methods apply for different species, the principles of eliminating undesirable exotics or weeds are the same. These are:

- 1) Kill or remove existing plants before they produce or disperse seeds. It is important to let none go unnoticed; each plant missed can produce enough seeds to quickly undo previous eradication efforts.
- 2) If existing weeds have gone to seed, remove the material as carefully as possible to prevent dispersal of the seeds. Note: A "weedeater" is efficient at cutting weeds to reduce fire hazard, but it can also disperse the seeds far and wide and can quickly enlarge weed infestations.
- 3) Eliminate seedlings each year that sprout from existing seed sources in the soil until all viable seeds have been exhausted. The amount of time required may vary considerably between species.

Establishing a good cover of native perennial shrubs, herbaceous plants and grasses will also help to suppress weeds. However, native annual wildflowers are generally non-competitive and are soon overrun with weeds unless:

- 1) Existing soil conditions favor the wildflowers over weeds. This may be the case where natural soil has been left undisturbed, but not where imported topsoil has been spread.
- 2) Weeds have not been introduced.
- 3) Careful and continued maintenance is done to control weeds. In a large area this is often impractical; therefore early eradication and prevention of weed introductions is of utmost importance.

Pampas grass

Pampas grass is a giant grass with large feathery plumes produced in late summer or early fall. Each plume has hundreds of thousands of seeds that quickly disperse in the wind. If plumes have already formed they should be clipped and disposed of in plastic garbage bags. Small pampas grass plants can be easily dug out, but large ones may be killed with a non-persistent systemic herbicide (ex. a 1 or 2 percent solution of Roundup or other herbicide containing isopropylamine salt of glyphosate), as recommended by a licensed Pest Control Advisor. It is best applied when the plants are vigorously growing in June or July prior to producing seed plumes. Pampas grass has leaves like

saw blades that can inflict deep cuts. Protective clothing, gloves and goggles should be worn when handling it.

Seed viability is short term, and once existing plants and the current and following year's crop of seedlings has been eliminated, future control involves finding and eliminating occasional new pioneers before seeds are produced.

Genista/French broom

Agenda Item No. 7B

Eradicating genista (upright shrubs 3 to 8-feet tall recognized by clover-like leaves on spindly stems, yellow pea like flowers in spring, and small bean-like seed pods) from any property is a long term commitment. Small ones are easily pulled. Large ones can be cut at the base, but sometimes re-sprout. Seedlings, which may appear in the thousands, can be hoed out or covered with thick mulch such as bark chips. It is important to locate and remove new seedlings and young shrubs before they have produced seeds; each pioneer seedling removed is a preventive measure against a new infestation. Genista should be removed only before or during flowering stage not while containing seed pods, as the seeds are likely to scatter and spread the infestation. Young seedlings may be pulled at any time. Since existing seeds in the soil may be viable for at least 50 years, genista must be controlled on a yearly basis.

English Ivy

English ivy (*Hedera helix*) is an invasive plant in forested areas where the soil is sufficiently deep and moist to sustain it. It was most likely established in Washington Park by birds, which eat the berries and pass the seeds. It can grow thick enough on the ground to eliminate most native ground covers, and competes well with weeds. Ivy also climbs trees and can eventually shade out much of the tree's foliage, weakening it. In those areas where it occurs in Washington Park it forms a dense cover and climbs both pines and oaks.

Ivy shows some resistance to herbicides, even Roundup, and may require repeated sprayings to kill it. Removing small patches by hand is not too hard; however some of those patches at Washington Park are large enough to make removal difficult.

At the very least, the ivy should be contained and not allowed to climb the trees. The arboreal parts of the ivy can be killed by cutting through all the stems of ivy near the base of the tree, and either pulling the ivy out of the tree or leaving it to die. This should be done on a yearly basis as long as the ivy remains.

Ice plant

Ice plant may be rolled like a carpet and the roots cut to free it, but sheer weight makes removal cumbersome for all but small patches. It does not re-sprout from the roots; however, since any piece containing succulent foliage may re-root in place and continue growing, it is important to pick up all the pieces. Spraying with a non-persistent systemic herbicide (ex. a 1 or 2 percent solution of Roundup or other herbicide containing isopropylamine salt of glyphosate), as recommended by a licensed Pest Control Advisor more easily controls large patches. The dead ice plant looks unsightly, but usually decomposes within two years.

Numerous ice plant seedlings may reappear, especially where ice plant or dead ice plant mulch has been removed; these seedlings are easily pulled by hand or dislodged with a hula hoe and raked up. Dead ice plant mulch left on the ground helps prevent weed invasions until native plants have a chance to fill in, and seems to discourage re-invasions of ice plant seedlings.

Tough perennial weeds

Kikuyu grass, Bermuda grass, Bermuda buttercup (*oxalis*) and certain other perennials may be controlled by spraying with a non-persistent systemic herbicide (ex. a 1 or 2 percent solution of Roundup or other herbicide containing isopropylamine salt of glyphosate), as recommended by a licensed Pest Control Advisor, according to directions on the label. The systemic herbicide reacts best on plants that are vigorously growing. Control will be most successful if the target species has been fertilized and irrigated prior to spraying, and if spraying is done during the season of most rapid growth. One or more follow-up sprayings may be needed to achieve complete eradication.

Annual weeds

Ripgut grass, rattlesnake grass, foxtail, annual sow thistle and most annual weeds are easily pulled by hand or hoed. However, such weeds left on the ground can re-root and continue growing. On a large scale such intensive hand weeding is often impractical. These weeds can often be controlled initially by removing old weed growth and applying a pre-emergent herbicide in the fall months just as the rainy season begins. Scattered weeds that appear can be spot-sprayed or hand pulled. If no weeds are allowed to set seed it may be possible to discontinue the pre-emergent applications after two or three years and simply do careful hand weeding and/or selective spraying, especially where the goal is to re-establish native vegetation from seed. However, a few annual weeds such as bur clover have seeds with long term viability that can persist in the soil for decades; these will need to be controlled on a yearly basis for an indefinite period.

Annual weeds can usually be suppressed by applying thick mulches of bark chips, pine needles or leaves over the bare soil, or simply letting the natural leaf litter accumulate.

Due to the size of Washington Park and the cost of spraying, chemical control may not be practical. Roundup, which is relatively harmless to humans and animals, must be sprayed during winter before the weeds go to seed. If spraying is done on a large scale, it should be done during years that monarch butterflies have not established overwintering sites in the park. Spot spraying of individual weeds or small patches could be done at any time.

If large scale weed control is not practical, then weeds should be pulled by hand around individual young trees and plants, and a mulch should be spread around the base of each plant.

Suggested Plantings

Any species in the *List of Appropriate Plants* (See page 22) may be used. However, it is suggested unless weed eradication is feasible, the majority of the plantings should be native shrubs and groundcovers which provide nectar sources for the butterflies and are able to compete with existing weeds.

Both species of currants (*Ribes*) are important nectar sources for monarch butterflies. They are attractive, easy to grow from cuttings, and adapt well to partially shaded environments. Hundreds of these may be planted. Note: these may need protection from deer when small.

Blue blossom ceanothus should be reintroduced into habitats that are not too shady. Again these may provide a late source of nectar.

Douglas iris is probably not a good nectar source, but the plants are attractive and tough enough to withstand mild abuse and compete somewhat with weeds. Patches of Douglas iris may be used extensively.

Creeping red fescue (*Festuca rubra*) is a native grass that is often used as a component of lawn grasses in partially shaded areas. Planted alone it forms a meadow of attractive fine-leaved grass. This species is probably the best for use in the "magic circles". The sprinkler used to provide water for the butterflies may also be used to keep the grass green during summer. Red fescue is somewhat drought tolerant, however, and may survive without irrigation once established. Occasional mowing during the growing season will help to keep it low and suppress annual weedy grasses.

Exotic Nectar Sources

A wide variety of non-native flowering plants that bloom during winter months may be considered as nectar sources for the butterflies. The best one seems to be Pride of Madeira (*Echium candicans*), a shrub with large purple spikes of tiny flowers. Monarch butterflies are highly attracted to this plant.

Other species are included in a small brochure entitled Nectar Sources for the Monarch Butterfly Overwintering in P.G. [available from Friends of the Monarchs organization.].

The planting of these non-natives in Washington Park is not appropriate to preserving the natural character of the park. However, these plants may be very appropriate for private residences surrounding the park. A volunteer program encouraging the use of these plants may be effective.

LIST OF APPROPRIATE NATIVE PLANTS

Agenda Item No. **7B**

<u>Scientific Name</u>	<u>Common Name</u>	<u>Suggested Spacing</u>
A. Trees		
<i>Pinus radiata</i>	Monterey Pine	15'
B. Shrubs		
* <i>Arctostaphylos tomentosa</i>	Shaggy-bark Manzanita	6'
<i>Baccharis pilularis</i> var. <i>consanguineum</i>	Coyote Brush	6'
* <i>Ceanothus thyrsiflorus</i>	Blue Blossom Ceanothus	10'
<i>Heteromeles arbutifolia</i>	Toyon	10'
<i>Lonicera hispidula</i>	Hairy Honeysuckle	4'
<i>Lupinus arboreus</i>	Yellow Bush Lupine	8'
<i>Mimulus aurantiacus</i>	Sticky Monkey Flower	4'
<i>Rhamnus californica</i>	Coffeeberry	8'
* <i>Ribes malvaceum</i>	Chaparral Currant	6'
* <i>Ribes sanguineum glutinosum</i>	Pink Flowering Currant	6'
<i>Rosa californica</i>	California Wild Rose	6'
* <i>Rubus ursinus</i>	California Blackberry	4'
<i>Symphoricarpos mollis</i>	Creeping Snowberry	4'
<i>Vaccinium ovatum</i>	Huckleberry	8'
C. Perennials		
<i>Achillea borealis</i>	Yarrow	3'
<i>Agrostis</i> spp.	Native Bent Grass	2'
<i>Aquilegia formosa</i>	Western Columbine	2'
<i>Artemisia douglasiana</i>	Mugwort	3'
<i>Aster chilensis</i>	Common California aster	3'
<i>Bromus carinatus</i>	California Brome	seeded
<i>Calamagrostis koelerioides</i>	Tufted Pine Grass	seeded
<i>Calamagrostis nutkaensis</i>	Pacific Reed Grass	seeded
<i>Calochortus albus</i>	White Globe Lily	1'
<i>Calystegia (Convolvulus) cyclostegius</i>	Coast Mourning Glory	3'
* <i>Cardamine californica</i> var. <i>integrifolia</i>	Milkmaids	1'
<i>Carex pansa</i>	Sand Sedge	2'
<i>Chlorogalum pomeridianum</i>	Soap Root	4'
<i>Deschampsia</i> spp.	Hair Grass	1'
* <i>Dichelostemma (Brodiaea) pulchella</i>	Blue Dicks	1'
<i>Dryopteris arguta</i>	Wood Fern Rye	6'
<i>Erigeron glaucus</i>	Seaside Daisy	3'
<i>Festuca rubra</i>	Red Fescue	seeded
<i>Fragaria vesca</i>	Wood Strawberry	1'
* <i>Iris douglasiana</i>	Douglas Iris	3'
* <i>Lathyrus vestitus</i>	Pacific Pea	3'
<i>Marah fabaceus</i>	Manroot/Wild cucumber	6'
<i>Pteridium aquilinum</i>	Bracken Fern	
<i>Satureja douglasii</i>	Yerba Buena	2'
<i>Sisyrinchium bellum</i>	Blue-eyed Grass	1'
<i>Stachys bullata</i>	Hedge Nettle	1'
<i>Stipa pulchra</i>	Purple Needlegrass	2' or seeded
<i>Triteleia ixioides (Brodiaea lutea)</i>	Golden Brodiaea	1'
* <i>Zigadenus fremontii</i>	Star Lily	2'
D. Annuals or Biennials		
<i>Clarkia lewesii</i>	Fairwell to Spring	seeded
<i>Collinsia heterophylla</i>	Chinese Houses	seeded
<i>Eschscholzia californica</i>	California Poppy	seeded
<i>Montia perfoliata</i>	Miner's Lettuce	seeded

* Possible nectar source

References for Revegetation Plan

Agenda Item No

7B

Brower, Lincoln, P., 1991. Follow-up Report to Mayor Schaefer and the Monarch Restoration Habitat Committee after our 10-11 October 1991 Meeting in Pacific Grove.

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Howitt, Beatrice F. and John Thomas Howell, 1996. The Vascular Plants of Monterey County, California. University of San Francisco Press.

General References

The Monarch Project, 1990. Conceptual Plan for the Conservation and Management Program for Washington Park, 10 Southwest Ash Street, Portland, Oregon. Report accepted by City Council, January 2, 1991. Excerpted recommendations approved for implementation by City Council, November 17, 1992.

GEORGE WASHINGTON PARK PLANT SPECIES LIST

<u>Botanical Name</u>	<u>Common Name</u>	<u>Non-local</u>		
		<u>Native</u>	<u>Native</u>	<u>Exotic</u>
Trees				
<i>Acacia baileyana</i>	Bailey Acacia			X
<i>Araucaria excelsa</i>	Norfolk Island Pine			X
<i>Cupressus macrocarpa</i>	Monterey Cypress		X	
<i>Ilex aquifolium</i>	English Holly			X
<i>Pinus radiata</i>	Monterey Pine	X		
<i>Prunus sp.</i>	Flowering Plum			X
<i>Quercus agrifolia</i>	Coast Live Oak	X		
<i>Sequoia sempervirens</i>	Coast Redwood		X	
Shrubs				
<i>Acacia longifolia</i>	Sydney Golden Wattle			X
<i>Arctostaphylos tomentosa</i>	Shaggy-bark Manzanita	X		
<i>Baccharis pilularis var. consanguineum</i>	Coyote Brush	X		
<i>Ceanothus thyrsiflorus</i>	Blue Blossom Ceanothus	X		
<i>Cistus sp.</i>	Rockrose			X
<i>Genista monosperulanus</i>	French Broom			X
<i>Mimulus aurantiacus</i>	Sticky Monkey Flower	X		
<i>Echium candicans</i>	Pride-of-Madeira			X
<i>Eriophyllum staechadifolium</i>	Lizard-tail	X		
<i>Heteromeles arbutifolia</i>	Toyon	X		
<i>Lonicera hispidula</i>	Hairy Honeysuckle	X		
<i>Lupinus arboreus</i>	Yellow Bush Lupine		X	
<i>Rhamnus californica</i>	Coffeeberry	X		
<i>Ribes malvaceum</i>	Chaparral Currant	X		
<i>Ribes sanguineum glutinosum</i>	Pink flowering Currant	X		
<i>Rosa californica</i>	California Wild Rose	X		
<i>Rubus vitifolius</i>	California Blackberry	X		
<i>Symphoricarpos mollis</i>	Creeping Snowberry	X		
<i>Toxicodendron diversiloba</i>	Poison Oak	X		
<i>Vaccinium ovatum</i>	Huckleberry	X		
Perennials				
<i>Achillea borealis</i>	Yarrow	X		
<i>Agoseris apargioides</i>	Dandelion	X		
<i>Agrostis spp.</i>	Native Bent Grass	X		
<i>Avena barbata</i>	Wild Oak			X
<i>Briza major</i>	Rattlesnake Grass			X
<i>Bromus carinatus</i>	California Brome	X		
<i>Bromus diandrus</i>	Ripgut			X
<i>Bromus rubra</i>	Red Foxtail			X
<i>Calamagrostis koelerioides</i>	Tufted Pine Grass	X		
<i>Calamagrostis nutkaensis</i>	Pacific Reed Grass	X		

<u>Botanical Name</u>	<u>Common Name</u>	<u>Non-local</u>		
		<u>Native</u>	<u>Native</u>	<u>Exotic</u>
Perennials				
<i>Calochortus albus</i>	White Globe Lily	X		
<i>Cardamine californica</i> var. <i>integrifolia</i>	Milkmaids	X		
<i>Carex pansa</i>	Sand Sedge	X		
<i>Carpobrotus edulis</i>	Hottentot Fig			X
<i>Claytonia perfoliata</i>	Miner's Lettuce	X		
<i>Cortaderia jubata</i>	Pampas Grass			X
<i>Crocosmia crocosmiiflora</i>	Montbretia			X
<i>Deschampsia</i> spp.	Hair Grass	X		
<i>Dichelostemma (Brodiaea) pulchella</i>	Blue Dicks	X		
<i>Dryopteris arguta</i>	Wood Fern	X		
<i>Elymus condensatus</i>	Giant Wild rye	X		
<i>Erodium cicutarium</i>	Red-stemmed Filaree	X		
<i>Festuca rubra</i>	Red Fescue	X		
<i>Iris douglasiana</i>	Douglas Iris	X		
<i>Lathyrus vestitus</i>	Pacific Pea	X		
<i>Marah fabaceus</i>	Manroot/Wild Cucumber	X		
<i>Medicago hispida</i>	Bur Clover			X
<i>Oxalis oregona</i>	Redwood Sorrel		X	
<i>Oxalis pes-caprae</i>	Bermuda Buttercup			X
<i>Pennisetum clandestinum</i>	Kikuyu Grass			X
<i>Piperia yadonii</i>	Yadon's Piperia	X (endangered species)		
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	Bracken Fern	X		
<i>Ranunculus californicus</i>	California Buttercup	X		
<i>Satureja douglasii</i>	Yerba Buena	X		
<i>Sisyrinchium bellum</i>	Blue-eyed Grass	X		
<i>Stachys bullata</i>	Hedge Nettle	X		
<i>Stellaria media</i>	Chickweed			X
<i>Stipa pulchra</i>	Purple Needlegrass	X		
<i>Triteleia ixioides (Brodiaea lutea)</i>	Golden Brodiaea	X		
<i>Tropaeolum majus</i>	Nasturtium			X
<i>Zantedeschia aethiopica</i>	Calla Lily			X
<i>Zigadenus fremontii</i>	Star Lily	X		
<i>Vicia</i> sp.	Vetch	X		
<i>Vulpia myuros</i> var. <i>hirsuta</i>	Foxtail Fescue			X