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**Bird Refuge Biological Resource Assessment  
and Tree Protection Plan**

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**Santa Barbara Zoological Gardens**

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**Santa Barbara, California**

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*Prepared for:*

**Santa Barbara Zoological Gardens  
500 Niños Way • Santa Barbara, CA 93103**

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*Prepared by:*



**525 Anacapa Street • Santa Barbara, CA 93101**

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**July 2003**

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PLANNING DIVISION**

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**Santa Barbara Zoological Gardens  
500 Niños Way • Santa Barbara, CA 93103**

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**July 2003**

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# **BIOLOGICAL RESOURCE ASSESSMENT FOR THE BIRD REFUGE AND TREE PROTECTION PLAN FOR THE PROPOSED SANTA BARBARA ZOOLOGICAL GARDENS IMPROVEMENTS**

## **1.0 SUMMARY**

This report provides the findings of a Biological Resources Assessment analysis and Tree Protection Plan for five projects proposed for the Santa Barbara Zoological Gardens (Figure 1). The five proposed projects include modifications or improvements to existing facilities at the Wave Site and Facilities Yard, and new construction for the Condor Exhibit, Tiger facilities, and Discovery Pavilion (Figure 2). This report analyzes the effects of these projects on the biological resources of the Andree Clark Bird Refuge (Bird Refuge) and specifically analyzes the effect of the proposed loss of trees near the Bird Refuge. This assessment includes a description of wildlife species utilizing the trees and provides recommendations to mitigate potential impacts.

This report also includes a Tree Protection Plan. It provides an inventory of all of the trees that will be potentially affected by the projects proposed for the Santa Barbara Zoological Gardens. This plan includes information concerning methods that may be utilized to protect individual trees, a general assessment of health of trees proposed for removal, and provides feasible mitigation such as replacement of trees and timing of tree removal to reduce short-term and long-term impacts.

SAIC biologists conducted reconnaissance surveys for wildlife and vegetation of the project sites in June and July 2003. All five project sites were surveyed for wildlife use. Trees potentially impacted by the proposed projects were mapped and inspected, and an assessment of tree health and importance for wildlife at the bird refuge was made.

## **2.0 PROJECT DESCRIPTION**

The following section includes a general description of the five different projects (Figure 2) currently proposed by the Santa Barbara Zoological Gardens.

### **2.1 Discovery Pavilion**

The proposed Discovery Pavilion (Figure 3a) would be located near the main entrance, in an area currently occupied by existing office space, the parrot garden, the capybara exhibit, and off-exhibit birdcages. The proposed Gibbon Off-Exhibit building would replace an existing gibbon building in an off-exhibit area near the Gibbon Island. The proposed Gibbon Off-Exhibit Building would entail removing an existing gibbon building in an off-exhibit area near Gibbon Island and construction of a new, larger facility.

### **2.2 Facilities Yard**

The proposed Service Yard Improvement Project (Figure 3b) would include various modifications to the existing service yard located in the southwestern part of the Zoo (see Figure 2). New structures would include permanent office space, workshops, equipment storage, a shade trellis, a green waste container, bulk material slots, and public bathrooms. All of these structures, except for the public bathrooms, would be constructed along the west side



Figure 1. Location of the Santa Barbara Zoological Gardens

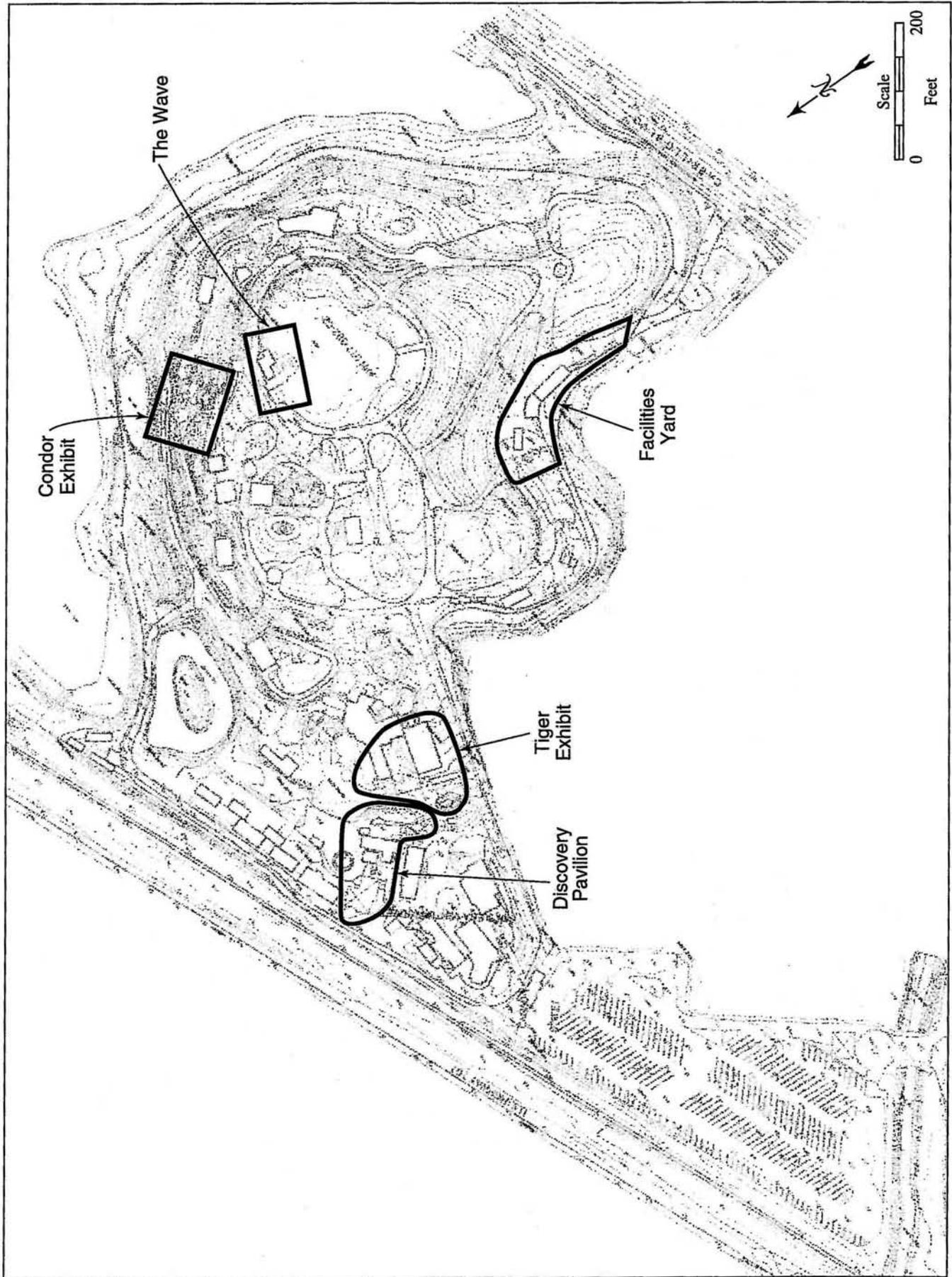
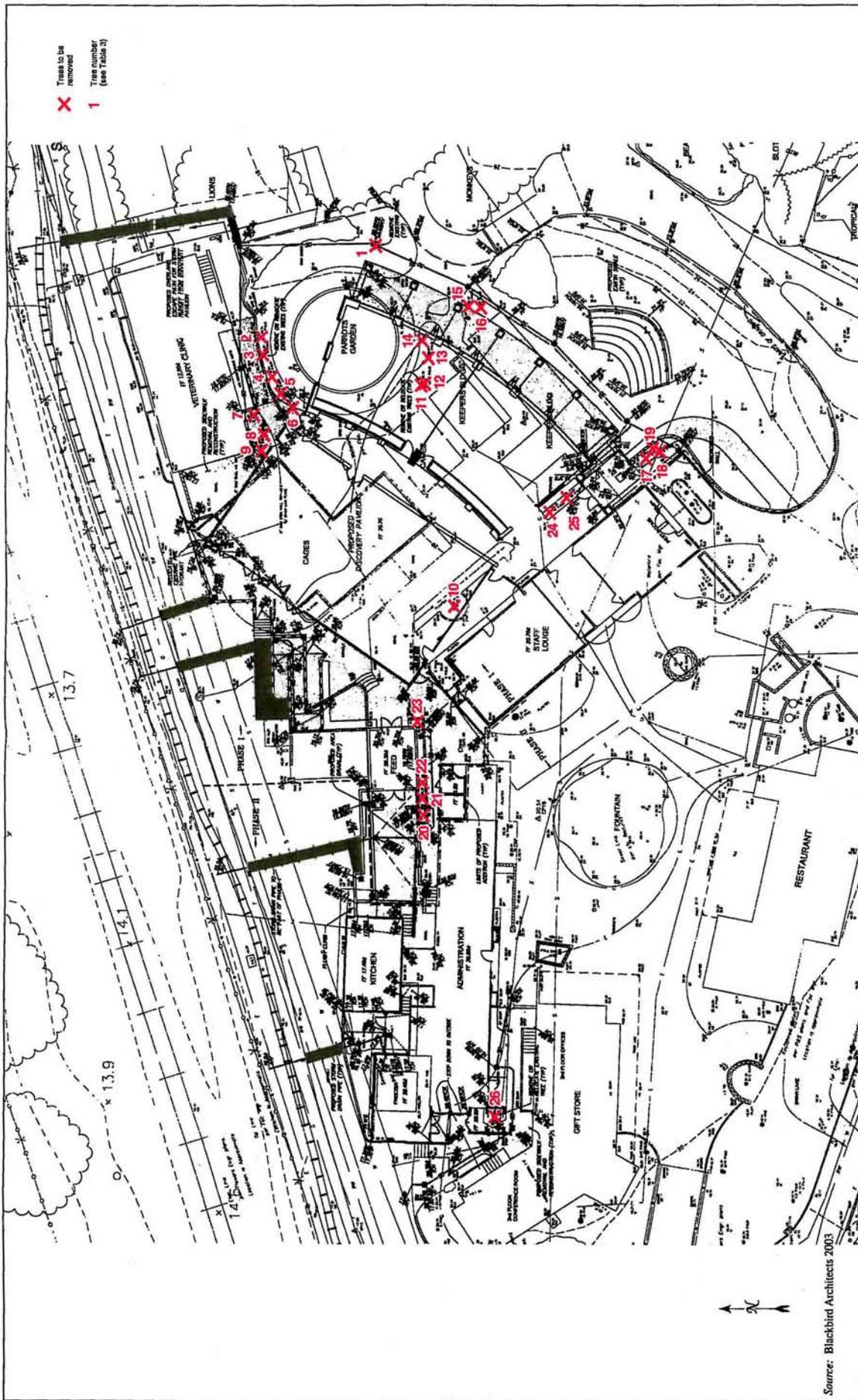


Figure 2. Santa Barbara Zoological Gardens Site Plan with General Locations of Proposed Projects



Source: Blackbird Architects 2003

Figure 3a. Discovery Pavilion

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of the Cabrillo Gate service road that runs along the entire length of the project site. The public bathrooms would be located north of a short pathway that leads to the Cats of Africa exhibit. Other improvements include repaving the Cabrillo Gate service road, regrading and repaving a section of pathway that leads to the Cats of Africa exhibit, and placing a sewer line along the north side of this pathway to connect with the sewer line for the Cats of Africa exhibit.

The proposed project area was disturbed by past development. The project site currently contains various temporary structures used for office space, workshops, and storage, as well as a more permanent haybarn/storage building. These structures were built within the last ten years. Most of the temporary structures would be removed as part of the proposed project, but the haybarn will remain in place. No structures are currently located in the southern half of the service yard.

### **2.3 Wave Project**

The proposed Wave Project (Figure 3c) would include replacing the existing Hilltop Barbecue and Picnic area with a new food services and restroom facility. The proposed food services and restroom area would be built within the same footprint as the existing barbecue and picnic area. In addition, the project would require the tie-in to an existing conduit line and electrical junction boxes.

Existing structures on the site include one small building about 50 feet (15 meters) by 25 feet (8 meters), a cement pad with three barbecue pits, and a paved bench area with a trestle overhang. The existing facility is bordered to the south and west by an open grassy knoll, and to the north and east by a paved walkway. The existing structures, located on the highest knoll of the zoo grounds, lie within the original footprint of the Child's Estate mansion. This area was disturbed during the initial construction of the barbecue facility.

### **2.4 Condor Exhibit**

The proposed Condor exhibit (Figure 3d) would be located between the Channel Island fox and bald eagle exhibits. The project includes fully enclosing the area between these two exhibits, installing two holding pens, relocating the existing water feature currently present in the area, and installing several dead trees for condor roosting. One coast live oak tree may be pruned and three other trees may be removed during construction. Pilings would be installed in the vicinity of the tree to support modifications to the viewing platform that is part of the exhibit.

### **2.5 Tiger Facilities**

The proposed Tiger exhibit (Figure 3e) would be located near the entrance to the zoo immediately adjacent to the new Discovery Pavilion facilities. The proposed project would include replacing the alligator pool, tropical bird aviary, and otter exhibits and removing several olive trees and other non-native vegetation along the entrance road near the entrance of the zoo, and the construction of a new fenced tiger viewing pen and facilities.







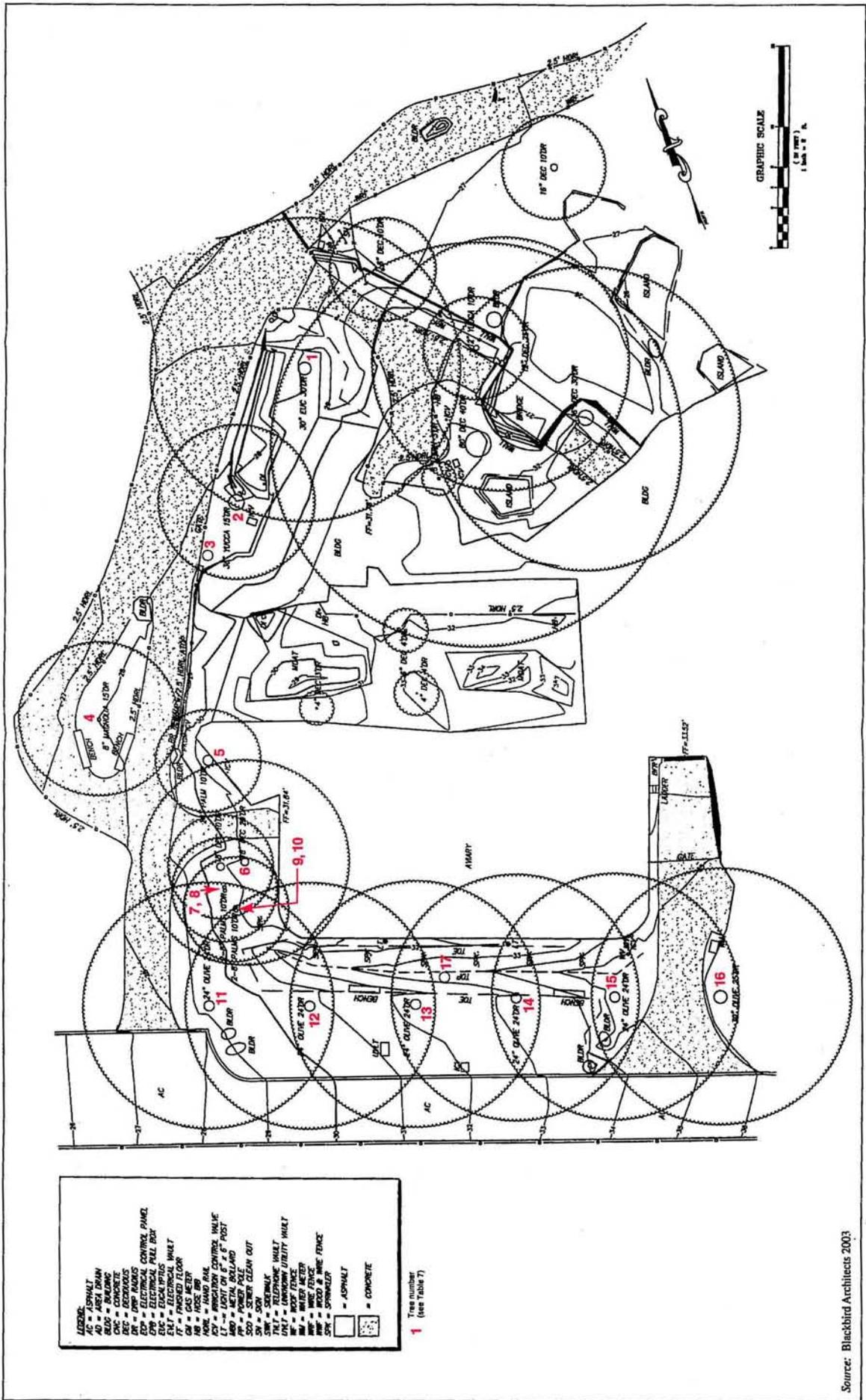


Figure 3e. Tiger Exhibit

Source: Blackbird Architects 2003

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### 3.0 EXISTING CONDITIONS

#### 3.1 The Santa Barbara Zoological Gardens

The present location of the Santa Barbara Zoological Gardens exhibits evidence of human occupation since prehistoric times and European use has been recorded as early as the 1850's. In 1897, John Beale built a large residential mansion, called the Vega Mar mansion, on the main knoll. The mansion, with its elaborately landscaped gardens and walkways, was a noted Santa Barbara landmark for nearly six decades (Wilcoxon and Imwalle 1995). After John Beale died, his wife subsequently married John Howard Child, and the mansion and surrounding land became known as the Child's Estate. Mrs. Child donated the estate to the Santa Barbara Foundation in 1947, which then donated the property to the City of Santa Barbara in 1953. The Child's Estate community park and zoo opened for the first time to the general public in August 1963.

#### 3.2 The Andree Clark Bird Refuge

The Andree Clark Bird Refuge is located on the eastern edge of the City of Santa Barbara at the intersection of Highway 101 and East Cabrillo Boulevard. The City of Santa Barbara has owned the Andree Clark Bird Refuge since 1909. Prior to the City's purchase of the land, the area was salt marsh habitat, which was seasonally connected to the ocean. Fresh water historically flowed into the marsh through Sycamore Creek (CERES 2003). The construction of the railroad in the 1880's isolated the Refuge from its major source of freshwater. Depending on tidal levels and season, the marsh often dried out and the area was occasionally used as a horse racetrack. In 1920 the area was dammed at Cabrillo Blvd. to create a reservoir. Soon after, the reservoir began to exhibit water quality problems (City of Santa Barbara 1986). In 1929, Mrs. Huguette Clark gave \$50,000 to the City to upgrade the lake and to create a wild bird refuge dedicated to the memory of her daughter, Andree Clark (Penfield and Smith 1985). The Refuge currently consists of 42 acres, including a lake of approximately 29 acres in area. A beach lagoon forms at the spillway on the beach side of Cabrillo Boulevard and is periodically inundated by the tide.

The vegetation surrounding the lake is primarily cattails, bulrush, willows, scattered coast live oak trees and numerous non-native ornamental shrubs and trees. More than half of the shoreline within the lake is vegetated with emergent vegetation consisting of cattail and bulrush. Three islands are located within the lake and are vegetated with similar plants.

In 1984/1985 a total of 221 species of birds (Table 1, at end of document, Source: Paul Lehman), two species of amphibians and one species of reptile was recorded at the Bird Refuge (Pennfield and Smith 1985). Mosquito fish were observed during this data collection period and tidewater gobies were observed in the beach lagoon in 1993 and 1995 (Ambrose et al 1995).

Of the 221 bird species recorded at the Bird Refuge, 81 were aquatic and 26 species are recognized as sensitive (Table 2). Of these 26 sensitive bird species, only a few are observed on a regular basis (i.e., more than five sightings in a given season). These sensitive species include California brown pelican (federal and state-listed as endangered). Pelicans are commonly observed swimming in the refuge. Double crested cormorants, whose rookery sites (nesting colonies) are included in the California Department of Fish and Game's list of California Natural Diversity Database Special Animals (July 2002) as a California Species of Special

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Concern (CSC). Raptor species including merlin, sharp-shinned, and Cooper's hawks (all CSC are all occasionally observed perching in trees within the zoo and at the refuge. The snowy egret, is commonly observed and this species rookery sites are considered a federal Species of Special Concern (FSC). The California thrasher (FSC) is commonly observed and a likely breeder in the upland vegetation within the refuge. The black-crowned night heron is included in the CDFG's "Special Animals" list, is regularly observed in the refuge, and is known to nest and roost within the Zoological Gardens. All of the other sensitive avian species are unlikely to be present in the refuge with any regularity, or do not occur in the refuge during the breeding season which minimizes the need for additional protection.

In addition to the sensitive bird species known to use the bird refuge as foraging and roosting habitat, the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) and Executive Order 13186 governs the taking, killing, possession, transportation, and importation of all migratory birds, their eggs, parts and nests. The take of all migratory birds, including double-crested cormorant and black-crowned night heron nests is governed by the Act's regulation of taking migratory birds for educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent over utilization. Further, the Act prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11). Certain exceptions apply to employees of the Department of the Interior to enforce the Act and to employees of public zoological parks, accredited institutional members of the American Zoo and Aquarium Association (formerly the American Association of Zoological Parks and Aquariums) and public scientific or educational institutions.

#### **4.0 METHODS AND RESULTS**

##### **Biological Resources Analysis**

SAIC biologists visited the proposed project sites at the zoological gardens on several occasions in June and July 2003. The surveys focused on identifying important biological resources associated with disturbances of the proposed projects, and assessing the impacts to resources at the Bird Refuge. In addition, recent biological reports were reviewed to identify additional resources that have been previously reported or may be present within and around the bird refuge.

##### **4.1 Wildlife Species**

**Discovery Pavilion:** The area in the vicinity of the proposed Discovery Pavilion consists of existing pens and buildings. Some avian species such as house sparrow, rock dove, Brewer's blackbird, and house finch were occasionally observed in the proposed project area, especially the food court. This area provides little resources for most of the wildlife species associated with the Bird Refuge.

**Facilities Yard:** The thick vegetation, trees, and different canopy layers in the vicinity of the existing Facilities Yard provides nesting and roosting sites for several species of birds. American crow, northern mockingbird, house finch, and California towhee were all observed in the area and may nest in the vegetation along the edge of the zoo property.

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**Wave Project:** The open grassy space around the existing facilities near the proposed Wave Project offer little food or cover for most wildlife species. Several species of scavenger birds (Brewer's blackbird and house sparrow) were observed in the area. The two large palm trees in the vicinity provide cache sites for acorn woodpeckers (important sites where woodpeckers store hundreds of acorns throughout the year).

**Condor Exhibit:** The proposed Condor Exhibit would be located between existing pens in an area overlooking the Bird Refuge. The site has already been landscaped including the placement of an artificial water feature. The existing trees in the vicinity of this site might be used occasionally by raptors or crows as they forage near the Refuge. The proposed condor exhibit is less than 200 feet from eucalyptus trees that are used by double-crested cormorants as a year-round roosting site and as a rookery site during the breeding season.

**Tiger Exhibit:** The proposed Tiger Exhibit would be located near a portion of the zoo that already contains several exhibits and pens. This area provides little resources for most of the wildlife species associated with the Bird Refuge. However, one of the trees proposed for removal is currently being used by black-crowned night herons for nesting. This species nests in a colony and is known to use the same site year after year. During the June-July surveys, five nests were observed in the tree, with active nesting observed in four of the nests. Black-crowned night heron nestlings were observed during the last site visit in mid-June. This species is expected to be a regular forager in the Bird Refuge.

## 4.2 Tree Inventory

### *Methods*

SAIC botanist, Lauren Brown, performed the tree inventory. A figure showing the locations and types of trees that would need to be removed or relocated within each of the project areas was provided by the zoo for the inventory. The type of tree, diameter at breast height (dbh), condition of the tree, and comments were recorded in a table format. Diameter breast height is the diameter of the central trunk on the tree at 54 inches (4.5 feet) above ground. For trees with more than one central trunk, a dbh was recorded for each stem greater than 1-inch dbh. In the case where there were many smaller stems coming off of a large trunk at the base of the tree, the dbh was measured below the branching. Some trees are more shrub-like (i.e., *Myoporum* and *toyon*) and may not have an obvious central stem. The largest stems were recorded and these trees were noted as shrub-like in the comments column of the tree inventory.

The condition of each individual tree was assessed visually and assigned a rating as follows:

- Poor - Tree is significantly damaged, diseased or otherwise appears to be stressed.
- Fair - Tree is alive and growing but does not appear to receive any special maintenance.
- Good - Tree is healthy and appears to be well maintained (receives appropriate water and pruning).
- Excellent - Only a specimen quality tree with ideal form which appears to receive appropriate care (water, pruning, soil condition, etc.) would qualify for this rating.

The visual assessment considered the overall structure of the tree, the color of the leaves, canopy cover, amount of dead wood present, and any signs of current or past disease or injury.

The condition rating for each tree is based on the characteristics of the species if grown in a suitable environment with proper maintenance.

For each of the project sites, a table listing the tree and information observed during the inventory was generated. Each table includes tree number, type of tree, dbh, condition, and comments. Comments included such items as noticeable damage from injury or disease and general notes on an individual or group of trees, and a note on whether the tree should be removed or considered for relocation; recommendations are discussed further under the Impacts section in this document. The numbers assigned to each tree or group of trees were recorded in the field and transferred to existing figures.

### Results

The tables for each project site listing the trees proposed for removal or relocation are provided below.

**Table 3. Trees to be Removed for the Discovery Pavilion (see Figure 3a)**

No.	Type	DBH	Condition	Comments/ Recommendations
1	Jacaranda	14	Good	Consider relocating tree.
2	Palm	8	Good	Consider relocating tree.
3	Palm	9	Good	Consider relocating tree.
4	Palm	9	Good	Consider relocating tree.
5	Palm	11	Good	Consider relocating tree.
6	Palm	10	Good	Consider relocating tree.
7	Palm	12	Good	Consider relocating tree.
8	Palm	12	Good	Consider relocating tree.
9	Palm	10	Good	Consider relocating tree.
10	Olive	5, 8	Good	Consider relocating tree.
11	Palm	14	Good	Consider relocating tree.
12	Palm	18	Good	Consider relocating tree.
13	Palm	16	Good	Consider relocating tree.
14	Palm	8	Good	Consider relocating tree.
15	Palm	12	Good	Consider relocating tree.
16	Palm	12	Good	Consider relocating tree.
17	Palm	6	Good	Consider relocating tree.
18	Palm	8	Good	Consider relocating tree.
19	Palm	2	Good	Small palm, possibly a recruit from seed rather than a planted tree. Consider relocating tree.
20	Pine	10	Good	Remove.
21	Pine	8	Good	Remove.
22	Pine	10	Good	Remove.
23	Palm	8	Good	Consider relocating tree.
24	Palm	10	Good	Consider relocating tree.
25	Palm	10	Good	Consider relocating tree.
26	Peruvian pepper	10, 9	Poor	Sparse foliage, many leaved drying and falling; no apparent pest or infection. Remove.

**Table 4. Trees to be Removed for Facilities Yard Improvements (see Figure 3b)**

No.	Type	DBH	Condition	Comments
1	Eucalyptus	16	Poor	Main stem is crooked, with many shoots coming off the bent stem above breast height; foliage is sparse. Not identified for removal.
2	Araucaria	14	Poor	Many defoliated stems, no apparent crown. Not identified for removal.
3	Acacia	10, 10	Fair	One stem appears to be dead, other in fair to good condition. Remove.
4	Acacia (?)	8,6,6,4	Poor	Appears to be dead, covered in morning glory vine. Difficult to determine species, no leaves on tree, dried leaves on ground appear to be <i>Acacia</i> , but may be from adjacent tree. Remove.
5	Acacia	6	Good	Tree appears to be in good condition, although covered in morning glory vine. Remove.
6	Silk oak	25, 20	Fair to good	Some larger branches trimmed in the past, tree is adjacent to rail tracks and may have been trimmed to accommodate tracks. Some branches are deformed, but tree appears to be well maintained and has new growth. Consider relocating tree.
7	Myoporum	12, 2, 2, 4, 1	Good	Shrub-like with one distinct larger stem and many smaller stems. Some smaller stems are resprouts from a larger cut stem. Remove.
8	Myoporum	8	Good	Shrub-like with one distinct larger stem and many smaller stems. Not identified for removal.
9	Pittosporum	10, 16	Good	Much branched, covered in a vine (Japanese lantern). Remove.
10	Myoporum	12	Good	Shrub-like with one distinct larger stem and many smaller stems. Remove.

Many of the trees around the existing facilities yard are overgrown with morning glory and other ivy plants. Some of the trees that are completely overgrown appear to be dead or greatly stressed (i.e., have little foliage, lack signs of new growth). Trees near the materials staging area (marked on the figure) do not appear to receive any special maintenance and materials (e.g., mulch, gravel, compost, etc.) are stored at the base of the trees. Several trees are between maintenance buildings and the tracks for the miniature railroad for zoo guests. These trees appear to be maintained and periodically trimmed, probably to keep the tracks clear.

In addition to the trees listed above, there are several trees along the zoo boundary fence that provide screening. As proposed, these trees would not be removed.

**Table 5. Trees to be Removed for the Wave Facility (see Figure 3c)**

No.	Type	DBH	Condition	Comments
1	Stump		Dead	Appears to have been left in place for decorative purposes. Remove.
2	Palm	12	Good	Very tall tree, may be difficult to relocate. Remove.
3	Bird of Paradise	N/A	Good	Clump or shrub, remove or relocate.
4a,b	Fig	14, 14	Good	Two small fig trees adjacent to fence, both have many small stems totaling 14" each. Remove or relocate.
6	Pittosporum	6, 6	Good	Adjacent to concrete walk. Remove.
6	Toyon	6	Good	Native shrub. Remove.
7	Toyon	6	Good	Native shrub. Remove.
8	Toyon	6, 4	Good	Native shrub. Remove.
9	Toyon	6, 4	Good	Native shrub. Remove.
10	Redwood	10	Good	Small native tree, not to be removed

In addition, there would be a conduit installed across a lawn near the Wave which would be adjacent to eight small Tipu trees (*Tipauna tipu*) and 2 Monterey pine (*Pinus radiata*).

**Table 6. Trees to be Removed for the Condor Exhibit (see Figure 3d).**

No.	Type	DBH	Condition	Comments
1	Cedar	6, 6	Fair to Poor	Main stems are curved, crown is healthy. Remove.
2	Cedar		Good	Remove or relocate.
3	Redwood	16, 18	Poor	Remove. A 6" dbh redwood, is good condition, not to be removed, is adjacent to tree to be removed.
4	Coast live oak		Good	Not to be removed.

There are several native coast live oak (*Quercus agrifolia*) trees adjacent to a paved pathway that runs along the boundary of the bird refuge beneath the existing exhibit viewing platforms. One coast live oak tree may be impacted during construction, but removal of the tree would be avoided. Pilings would be installed in the vicinity of the tree to support modifications to the viewing platform that is part of the exhibit, and the tree may need to be trimmed to accommodate equipment; currently, there is an approximately 10-foot height clearance beneath the tree canopy. The exhibit and construction has been designed to avoid removal and to minimize impacts to the tree. The tree is within a fairly high retaining wall adjacent to the paved path and a portion of the critical root zone is restricted, but the tree appears to be healthy and well maintained, and is in good condition.

**Table 7. Trees to be Removed for the Tiger Exhibit (see Figure 3e).**

No.	Genus/Species	DBH	Condition	Comments
1	Eucalyptus	18, 18, 14	Fair to Good	Foliage is sparse, many bare limbs; tree appears to be generally healthy; tall tree used for nesting by black herons. Remove.
2	Spanish bayonet	14, 28, 24	Good	Remove or relocate.
3	Jacaranda	4	Fair	Sparse foliage, irregular form, many spurs (indicates over-pruning or other stresses). Remove.
4	Magnolia	9	Excellent	Tree is in central, highly visible location near the zoo entrance, appears to be well maintained. Consider relocating
5	Palm	12	Good	Consider relocating.
6	Umbrella plant	Group	Good	Large ornamental shrub, two main groups of several stems each. Remove
7	Palm	6	Good	Consider relocating.
8	Palm	8	Good	Consider relocating.
9	Palm	6	Good	Consider relocating.
10	Palm	3	Fair	Top of palm is bent. Remove
11	Olive	10, 8, 8	Good	Remove or consider relocating.
12	Olive	12, 10	Good	Remove or consider relocating.
13	Olive	8, 6, 10, 12	Good	Remove or consider relocating.
14	Olive	10, 10, 6, 6	Good	Remove or consider relocating.
15	Olive	16, 6	Good	Remove or consider relocating.
16	Olive	14, 10, 6	Good	Remove or consider relocating.

In addition, to the trees listed above, there are several tree ferns growing adjacent to the existing exhibit wall near the olive trees. These tree ferns likely need to be removed or relocated.

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## 5.0 IMPACTS AND RECOMMENDATIONS

### 5.1 Wildlife Species

The results of the biological resources survey effort indicate that most of the landscaped areas within the five current proposed project sites are used in varying degrees by wildlife species. Few of the sites support any of the mammalian, amphibian, or reptile species that are commonly observed at the Bird Refuge and therefore none of these species would be affected by any of the proposed actions. However, several common avian species found in the refuge are expected or known to use many of the trees within the zoological gardens as roost sites, foraging habitat, and potential nest sites. Except for two notable exceptions (double-crested cormorant and black-crowned night heron), most of the aquatic bird species regularly observed at the refuge would not be affected by any of the proposed construction activities including tree removal or replacement. Construction noises and tree removal could possibly affect bird breeding if the project closest to the refuge (Condor Exhibit) or projects possessing suitable breeding habitat (Facilities Yard and Tiger Exhibit) were conducted during the bird breeding season (March 15 through August 1).

As proposed, the eucalyptus tree providing black-crowned night heron nesting habitat in the footprint of the proposed Tiger Facility would be removed. The loss of this tree would result in a permanent loss of breeding habitat for this species and would represent a loss of four or five active nests for this species. The U.S. Fish and Wildlife Service (USFWS) may consider the removal of any active nest as a violation of the Migratory Bird Treaty Act (MBTA). However, after the nestlings have left the nests, CDFG would prefer that trees would remain for those species that use a site year-after-year. The CDFG would not consider the loss of these nests as a violation of the MBTA (Morgan Wehtje, CDFG, personal communication July 2003). Impacts on individual birds would be reduced if construction activities, including tree removal and pruning were scheduled outside of the breeding season for this species; this species may begin nesting in late winter and could extend to the end of August. It is not known whether this species breeds in other trees in the area; however, other trees are apparently available in the immediate vicinity. Because the eucalyptus tree used by black-crowned night herons for nesting would be removed during the non-breeding season and there is other available nesting habitat within the zoo and Bird Refuge, impacts on black-crowned night herons would be adverse but not significant.

Activities in the vicinity of the double-crested cormorant rookery (Condor Exhibit) that would result in loud noises may affect the breeding success of cormorants nesting within approximately 200 feet of the proposed action. Impacts to individuals would be reduced if loud construction activities, including the initial grading of the site, heavy equipment use, tree removal, and pruning were scheduled outside of the breeding season for this species (early spring to the end of August). Other construction activities, including cement pouring, grading by hand, wood work landscaping and mesh enclosure installation, are expected to result in noise levels similar to existing conditions, are not expected to affect nesting behavior, and could therefore, occur during the breeding season.

If active nests are detected in any of the trees proposed for removal during the survey that would occur immediately prior to removal, those trees shall not be removed until all nesting activities have ceased and young of the year birds have fledged. Because the removal of the trees is unlikely to affect the success of the cormorant breeding, the action is unlikely to affect

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the rookery site, which is protected under the California Fish and Game Code. Therefore, impacts on the double-crested cormorant rookery site would be less than significant.

Most of the other common and sensitive species expected to be present at the different project sites would not be affected by construction activities and tree removal if trees are removed during the non-breeding season for birds. The Zoological Gardens provides abundant nesting, foraging and cover for wildlife species and is expected to replace any removed trees with new plantings. Therefore impacts on common and sensitive wildlife species resulting from the proposed projects would be less than significant. The following protection measures are recommended to further reduce impacts at this site.

#### *Recommendations to Reduce Impacts on Avian Species*

Impacts on the double-crested cormorant rookery are expected to be adverse, but less than significant. The implementation of the proposed mitigation would further reduce potential impacts on the black-crowned night heron colony and the double-crested cormorant rookery and roosting site located north of the Santa Barbara Zoological Garden's elephant pens.

- Schedule tree removal and heavy construction activities resulting in loud noise levels at the Tiger Facilities and Condor Exhibit to occur between August 15 and March 1 to avoid the bird breeding season. If tree removal or pruning is to occur at any of the other project sites during the breeding season (April through August), survey the site immediately prior to any disturbances to ensure that no nests have been, or are in the process of being built in any of the trees proposed for removal. Construction activities could occur within the onset or the latter part of the breeding season after a qualified biologist surveys the area to positively determine that nesting activities have not yet begun or have already ceased.
- Schedule daily tree removal activities at the tiger facilities to avoid periods when the black-crowned night heron roost is in use (which varies in different seasons) to avoid disturbing double-crested cormorants roosting in the trees during the peak use periods. Activities involving tree removal should not begin each day until all of the birds have left the roost sites.
- Replace the removed trees with species that provide the same functions as the eucalyptus tree. Replacement trees should eventually be of the same stature (e.g., over 30 feet tall), and contain an open canopy with exposed branches and be planted in the same vicinity as the removed trees and should not be located in any areas where a roost or rookery site could be later construed as a nuisance.
- Conduct tree removal in a timely fashion to reduce noise impacts to birds nesting in the general area.
- Conduct several nights of surveys at the cormorant roosting site within two weeks prior to tree removal activities to record the use of the trees at the time of the removal and to ensure that no nests have been built in the trees proposed for removal. Conduct periodic surveys of the rookery/roosting site during the tree removal activities to ensure that cormorants are continuing to use the site in the same fashion as they were prior to initiation of tree removal activity, and that there are no impacts on breeding activities such as nest abandonment. If noticeable changes occur, consult with biologist conducting surveys to modify activities to reduce effects. Surveys should also be

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conducted several times later in the breeding season to ensure that cormorants continue to nest at the site in numbers similar to pre-disturbance levels.

## 5.2 Impacts to Trees and Tree Protection Measures

Most of the trees at the zoo are non-native ornamental species that were selected for landscape and aesthetic value. With regard to ecological value, non-native trees are typically not considered valuable, with the exception of trees that provide nesting, roosting or other functions for wildlife. For the Santa Barbara Zoo project sites, the removal of the trees would not be considered a significant botanical impact as the projects are designed to improve the zoo and replacement landscaping is incorporated into the project design. Native trees including a small native redwood (*Sequoia sempervirens*) and four toyon (*Heteromeles arbutifolia*), a native shrub or small tree, that were planted as part of landscaping would be removed. In addition, there are two native trees, a coast live oak (*Quercus agrifolia*) and coast redwood, that would be affected by project construction, but would not be removed. For those trees that are in poor or declining condition, removal would be beneficial, as it would eliminate a potential safety threat as well as a source of pests or disease. In addition to removal of trees, construction activities can severely injure or kill a tree unless measures are taken to protect trees in the vicinity of construction.

Although removal of trees for proposed project construction would not be considered a significant impact, it should be recognized that trees in a maintained landscape represent a monetary investment that includes the initial cost of the tree and the maintenance employed over time to sustain the tree. In some cases, it may be beneficial to relocate a tree if removal can't be avoided. The following should be considered when selecting a tree for relocation:

- Cost for replacing the tree; monetary and time cost (it will take many years to replace a larger tree).
- Cost for moving the tree; construction cost and additional maintenance (moved trees may require extra care until they become re-established).
- Potential for the tree to survive a move (i.e., type of tree or species; health; age).
- Availability of suitable relocation site.

Tables 3 through 7 include notes in the comments section identifying trees that should be removed or considered for relocation. Trees that are in good condition and appear to offer aesthetic value that would take time to replace, if the tree were lost and replaced with nursery stock, were identified for consideration for relocating. However, the consideration for relocating the trees is discretionary, but should consider the cost of relocating and extra maintenance of the tree.

The following summarizes the proposed tree removal from each of the project sites:

**Discovery Pavilion:** A total of 26 trees would be removed for construction of the Discovery Center including 20 palms of various sizes and types, three pines (*Pinus* sp.), one olive (*Olea europaea*), one Jacaranda (*Jacaranda mimosifolia*), and one Peruvian pepper (*Schinus molle*). All of the trees appear to be in good condition with the exception of the pepper tree. Removal of the Peruvian pepper tree is recommended as the tree appears to be declining in health and may become a safety hazard or source of infection to other trees, although the tree is in an isolated

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location. As stated above, there are no adverse impacts associated with the removal of the trees, but there may be a potential cost/benefit for relocating some of the trees from this location. Nearly all of the trees in this area are in designated planting areas or planting boxes. Since the trees identified for removal at this location are healthy and are already growing in fairly confined spaces, they may be good candidates for relocation if a suitable transplant site can be identified. The smaller palm trees in particular should be utilized as much as feasible for any new landscaping efforts associated with the proposed zoo projects.

**Facilities Yard:** Five trees and two large *Myoporum* shrubs (*Myoporum laetum*) would be removed during construction for proposed improvements to the Facilities Yard. Trees designated for removal are all non-native ornamental trees and three acacia (*Acacia* sp.), one *Pittosporum* (*Pittosporum undulatum*) and one silk-oak (*Grevillea robusta*). In addition, there is one eucalyptus (*Eucalyptus* sp.), one araucaria (*Araucaria* sp.), and one *Myoporum* identified on the Figure (3b) and included in the tree inventory (Table 4) that are not identified for removal but may be within the construction area. The eucalyptus, acacia and araucaria trees near the mulch piles are mostly in poor health, do not appear to receive any special maintenance, and are within an area densely overgrown with ivy. It is recommended that these trees be removed and not considered for relocation. Both the *Pittosporum* and *Myoporum* are fairly fast-growing species commonly used for landscaping in the Central Coast. These trees would likely be costly to relocate and it is recommended that these trees be removed and not considered for relocation. The silk-oak tree at Facilities Yard, although it does not appear to have received any special maintenance over time to improve the aesthetic quality of the tree, it is a very large tree (dbh 20, 25) in good health. The silk-oak should be considered for relocation if a suitable location within the zoo property can be identified.

In addition to the trees that are identified for removal, there are many trees in the vicinity of the Facilities Yard that provide screening between the zoo property and residential development. All the trees in this location are susceptible to invasion by non-native ivy. It is likely that additional trees will decline in health or die if the ivy is not controlled and maintenance implemented to improve the health of the trees in this location.

**Wave Facilities:** Construction of the Wave project would remove one dead stump, one fan palm (*Washingtonia* sp.), one *Pittosporum*, two small fig trees (*Ficus* sp.), one bird of paradise (*Strelitzia* sp.), and four native toyon (*Heteromeles arbutifolia*). There would be no impacts associated removal of any of these trees. The *Pittosporum*, fig trees and bird of paradise are small and in good condition; these trees could be considered for relocation if needed for landscaping around the new facilities, but it is not required. The palm tree is in good condition, but it is a very tall tree and may not survive relocation. The palm could be considered for relocation if a suitable transplant location can be found. Toyon is a native shrub or small tree often used in landscaping. In this location, the toyons are planted with a coast redwood (not to be removed) in a small, walled planting area adjacent to the existing building. Since the toyon were planted as part of the landscaping and are not a component of native habitat, nor do they provide value to native wildlife at the current location, the removal of the toyon would have no impact. It is not known if toyon can be successfully relocated, but it is likely that relocation of this species would require special care after relocation for the shrubs to adjust and re-establish. Toyon are fairly fast growing and planting nursery stock would likely be more successful than relocating the existing shrubs.

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In addition to tree removal associated with construction, installation of a conduit near the proposed Wave may impact eight small Tipu trees and two Monterey pine. These trees are not identified for removal, but trenching may cause damage to the root system if trenching occurs within the critical root zone. If a tree is severely damaged, it may not recover. The Tipu trees and Monterey pine are planted as part of the landscaping and the loss of these trees would not be an adverse botanical impact. The aesthetic value of the trees at this location, however would be lost. Any trees damaged during construction should receive special care to ensure the tree recovers.

**Condor Exhibit:** Three trees have been identified for removal in association with the proposed Condor Exhibit including two cedar (*Calocedrus decurrens*) and a small coast redwood. One of the cedar trees is bent but still growing; the tree appears to be rooted under the viewing platform and likely became deformed as the canopy sought better light. This tree would not likely survive relocation. The other cedar is growing straight and is in good condition and should be considered for relocating. There are two small redwood trees growing in a slope adjacent to the paved pathway. The redwood identified for removal is in poor condition and should be removed. The other redwood, if it is to be preserved as indicated on the plan, should be protected to avoid damage during construction.

In addition, several native coast live oak (*Quercus agrifolia*) trees are present in the project vicinity, and one may be affected by the installation of two caissons to support modifications to the viewing platform for the exhibit. This tree and the proposed construction activities were investigated by a County-approved arborist who concluded that installation of the caissons would not likely impact the tree. However, the tree may need to be trimmed to allow equipment access and there is potential for damage to the tree from construction equipment (B. Spiewak, 2003). The oak tree is adjacent to a paved pathway and a portion of its roots is covered by pavement. However, the tree appears to be healthy in its existing setting. It is not likely that construction will infringe on the root zone or otherwise damage the tree, but it is recommended that using proper techniques for trimming the tree, implementing protection measures during construction, and following construction with proper maintenance, should ensure that the tree is not lost; however there would be no impacts due to loss of native oak trees associated with the project.

**Tiger Exhibit:** Project plans for the proposed Tiger exhibit have not been finalized and it is not clear which trees would need to be removed. However, trees within the existing exhibit and vicinity were recorded for planning purposes. A total of ten trees have the potential of being removed by construction of the Tiger exhibit including six palms, one jacaranda, one eucalyptus, one Spanish bayonet (*Yucca aloifolia*), and one magnolia (*Magnolia grandiflora*). In addition, two large clumps of umbrella plant (*Schefflera* sp.) and several tree ferns (*Dicksonia* sp.) may be removed. There is also a path lined with olive trees on the south side of the proposed exhibit location and several olive trees may be removed or otherwise affected by construction of the Tiger exhibit.

All of the trees and other plants are ornamental landscaping plants and there would be no impacts associated with the removal of the trees. The jacaranda, eucalyptus and one of the palms appear to be declining in health and relocation of these trees is not recommended. The three other palm trees should be considered for relocation if suitable planting locations can be found or if these species can be incorporated into any landscaping plans associated with the new zoo facilities. The tree ferns and umbrella plant are unique ornamental species that can

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provide diversity to a landscape. Tree ferns are slow-growing plants and are often expensive to purchase. The tree ferns and umbrella plant should be considered for replanting at a suitable location. The magnolia tree is in a highly visible location in the center of a public walkway and appears to have been well maintained to preserve its aesthetic value; it is within a restricted planting area and it is recommended that this tree be considered for relocation. The Spanish bayonet and olive trees are in good condition and should be considered for relocation.

*Tree Protection Measures (for trees not affected by construction)*

The following tree protection measures are adapted from the Santa Barbara County Planner's Guide to Conditions of Approval and Mitigation Measures (SBCPD 1999) and address protection of oak trees. While these recommendations apply to native trees, the same protection measures can be used to preserve the existing trees and minimize impacts to trees or other ornamental species and landscaped areas during construction of the proposed zoo facilities. In addition, Appendix A of this report includes information on methods to preserve and protect desirable trees from damage during construction (NRCS 2003).

- Construction areas will be designated. All ground disturbances including grading for buildings, access ways, easements, subsurface grading, etc., shall be prohibited outside construction envelopes.
- No grading or development shall occur within the driplines of existing trees with the exception of those trees designated for removal.
- All equipment, personnel and construction activities will be restricted to areas outside the dripline of existing trees with the exception of those trees designated for removal.
- Designate the location and extent of dripline for all trees to be protected during construction with fencing or other suitable material.
- Equipment storage and staging areas shall be designated on approved grading and building plans.
- All trees within 25 feet of proposed ground disturbances shall be temporarily fenced with chain-link or other material satisfactory to P&D throughout all grading and construction activities. The fencing shall be installed outside the dripline of each tree, and shall be staked every six feet.
- No construction equipment shall be parked, stored or operated within any tree dripline.
- No fill soil, rocks, or construction materials shall be stored or placed within the dripline of all trees.
- No artificial surface, pervious or impervious, shall be placed within the dripline of any trees.
- Any roots encountered that are one inch in diameter or greater shall be cleanly cut. This shall be done under the direction of a P&D approved arborist/biologist.
- Any trenching required within the dripline or sensitive root zone of any specimen tree shall be done by hand.
- Any construction activity required within three feet of a tree's dripline shall be done with hand tools.

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- Only designated trees shall be removed.
  - Any trees which are removed and/or damaged (more than 25% of root zone disturbed) shall be replaced.
  - Where necessary to remove a tree and feasible to replant, trees shall be boxed and replanted. A drip irrigation system with a timer shall be installed. Trees shall be planted immediately after removal and shall be irrigated and maintained until established (five years). The plantings shall be protected from predation by wild and domestic animals, and from human interference by the use of staked, chain link fencing (or other suitable material) and gopher fencing during the maintenance period.
  - Maintenance of trees shall be accomplished through water-conserving irrigation techniques.
  - Trees scheduled for removal shall be boxed and replanted.
  - Any unanticipated damage that occurs to trees or sensitive habitats resulting from construction activities shall be mitigated in a manner approved by P&D [or permitting agency]. This mitigation may include but is not limited to posting of a performance security, tree replacement on a 10:1 ratio and hiring of an outside consultant biologist to assess the damage and recommend mitigation.
  - All trees located within 25 feet of proposed buildings shall be protected from stucco or paint during construction.
  - A P&D [or permitting agency] approved arborist shall be onsite throughout all grading and construction activities which may impact trees. [May be modified depending on permitting agency requirements. Periodic inspections by qualified arborist or botanist to ensure protection measures are in place may be sufficient, with permitting agency approval.]

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Table 1. Bird Species Frequenting the Andree Clark Bird Clark Refuge

Species	SEASON			
	Spring	Summer	Autumn	Winter
Red-throated Loon			R	R
Pied-billed Grebe	C	U*	C	C
Horned Grebe				Ca
Eared Grebe	U	Ca	U	C
Western Grebe	C	R	C	C
American White Pelican			Ca	Ca
Brown Pelican	R	U	U	U
Double-crested Cormorant	C	R	C	C
Magnificent Frigatebird		Ca		
American Bittern	R		R	R
Least Bittern	R	R*	R	R
Great Blue Heron	C	C*	C	C
Great Egret			R	R
Snowy Egret	R		U	U
Little Blue Heron	Ca			
Cattle Egret	R		R	R
Green-backed Heron	U	U*	U	U
Black-crowned Night Heron	C	C*	C	C
Wood Stork			Ca	
Tundra Swan				Ca
Great White-fronted Goose	Ca			Ca
Snow Goose				Ca
Ross' Goose				Ca
Brant			Ca	Ca
Canada Goose	Ca		Ca	Ca
Wood Duck	Ca	Ca	R	Ca
Green-winged Teal	R		R	R
Mallard	U	R	U	U
Northern Pintail	R		R	R
Blue-winged Teal	R		R	R
Cinnamon Teal	U		R	R
Northern Shoveler	R		R	R
Gadwall	R		R	R
Eurasian Wigeon			Ca	Ca
American Wigeon	R		R	R
Canvasback	R		R	R
Redhead	R		R	R
Ring-necked Duck	R		R	R
Greater Scaup			Ca	Ca
Lesser Scaup	R		U	U
Surf Scoter				Ca
Bufflehead	R		R	U
Hooded Merganser			Ca	
Common Merganser			Ca	
Red-breasted Merganser	U		U	U
Ruddy Duck	C	C*	C	C
Turkey Vulture	R	R	R	
Osprey			R	
Sharp-shinned Hawk	R		U	U
Cooper's Hawk	R		U	U

Table 1. Bird Species Frequenting the Andree Clark Bird Clark Refuge

Species	SEASON			
	Spring	Summer	Autumn	Winter
Red-shouldered Hawk	U	U*	U	U
Broad-winged Hawk	Ca			
Red-tailed Hawk	U	R	U	U
American Kestrel	U	U*	U	U
Merlin			R	R
Virginia Rail	U		U	U
Sora	U		U	U
Common Moorhen	R		U	U
American Coot	C	C*	C	C
Black-bellied Plover		R	R	
Semipalmated Plover		R	R	
Killdeer	U	U*	U	U
Black-necked Stilt	R	R	R	
American Avocet	R			
Greater Yellowlegs	U	U	U	U
Lesser Yellowlegs	R		R	
Solitary Sandpiper			Ca	
Willet	U	R	U	U
Spotted Sandpiper	C	R	U	U
Whimbrel			R	
Marbled Godwit			R	
Sanderling			R	
Western Sandpiper	R	R	R	
Least Sandpiper	U	U	U	U
Baird's Sandpiper			Ca	
Pectoral Sandpiper			Ca	
Dunlin			R	
Short-billed Dowitcher	R	U	U	
Long-billed Dowitcher	U	U	U	U
Common Snipe	R		R	
Wilson's Phalarope	R	R	R	
Red-necked Phalarope			R	Ca
Franklin's Gull			Ca	
Bonaparte's Gull			R	R
Heermann' Gull	C	C	C	C
Mew Gull	U		U	U
Ring-billed Gull	C	U	C	C
California Gull	C	U	C	C
Herring Gull	R		U	U
Thayer's Gull			U	R
Western Gull	C	C	C	C
Glaucous-winged Gull	U	Ca	U	U
Glaucous Gull	Ca			
Caspian Tern	R	R	R	
Common Tern			R	
Forster's Tern	U	U	U	U
Least Tern		Ca		
Black Tern			Ca	
Rock Dove	C	C*	C	C
Band-tailed Pigeon			R	R
Spotted Dove	R	R	R	R
Mourning Dove	C	C*	C	C
Common Barn Owl	U	U*	U	U

Table 1. Bird Species Frequenting the Andree Clark Bird Clark Refuge

Species	SEASON			
	Spring	Summer	Autumn	Winter
Great Horned Owl	U	U*	U	U
Lesser Nighthawk	Ca		Ca	
Vaux's Swift	R		R	
White-throated Swift			R	
Black-chinned Hummingbird	R			
Anna's Hummingbird	C	C*	C	C
Costa's Hummingbird	R			
Rufous Hummingbird	R		R	
Allen's Hummingbird	U	U*	R	
Belted Kingfisher	U	U	U	U
Acorn Woodpecker	C	C*	C	C
Red-breasted Sapsucker	R		R	R
Nuttall's Woodpecker	U	U*	U	U
Downy Woodpecker	U	U*	U	U
Northern Flicker	U	U	U	U
Olive-sided Flycatcher			R	
Western Wood-Pewee	R		R	
Willow Flycatcher			R	
Least Flycatcher			Ca	
Hammond's Flycatcher	Ca			
Western Flycatcher	R		R	
Black Phoebe	C	C*	C	C
Eastern Phoebe				Ca
Say's Phoebe	U		U	U
Ash-throated Flycatcher	R		R	
Tropical Kingbird			R	Ca
Cassin's Kingbird			R	
Western Kingbird	R		U	
Eastern Kingbird			R	
Purple Martin	Ca			
Tree Swallow	R		Ca	
Violet-green Swallow	R		Ca	
Northern Rough-winged Swallow	U	U*	U	
Bank Swallow	Ca			
Cliff Swallow	C	C*	U	
Barn Swallow	U	U*	U	
Scrub Jay	C	C*	C	C
American Crow	C	C*	C	C
Plain Titmouse	U	U*	U	U
Bushtit	C	C*	C	C
Red-breasted Nuthatch				R
White-breasted Nuthatch	R		R	R
Brown Creeper				R
Rock Wren			Ca	
Bewick's Wren	C	C*	C	C
House Wren	U	R	U	U
Winter Wren				R
Marsh Wren	U		U	U
Golden-crowned Kinglet			R	R
Ruby-crowned Kinglet	C		C	C
Blue-gray Gnatcatcher	U		U	U
Swainson's Thrush	Ca			
Hermit Thrush	U		U	U

Table 1. Bird Species Frequenting the Andree Clark Bird Clark Refuge

Species	SEASON			
	Spring	Summer	Autumn	Winter
American Robin	R		R	R
Varied Thrush			Ca	Ca
Wrentit	U	U*	U	U
Northern Mockingbird	C	C*	C	C
Sage Thrasher			Ca	
California Thrasher	U	U*	U	U
Water Pipit	U		U	U
Cedar Waxwing	U		U	U
Loggerhead Shrike	U	R	U	U
European Starling				
Solitary Vireo	R		R	
Hutton's Vireo	U	U*	U	U
Warbling Vireo	U		U	
Tennessee Warbler			Ca	
Orange-crowned Warbler	U	R*	U	U
Nashville Warbler	R		R	
Virginia's Warbler			Ca	
Yellow Warbler	U		U	Ca
Yellow-rumped Warbler	C		C	C
Black-throated Gray Warbler	R		R	
Townsend's Warbler	U		U	U
Hermit Warbler	R		R	
Palm Warbler			R	Ca
Blackpoll Warbler			Ca	
MacGillivray's Warbler	R		R	
Common Yellowthroat	C	U*	C	C
Wilson's Warbler	R		U	
Summer Tanager			Ca	
Western Tanager	U		U	
Black-headed Grosbeak	R		R	
Blue Grosbeak			Ca	
Lazuli Bunting			R	
Indigo Bunting			Ca	
Brown Towhee	C	C*	C	C
Chipping Sparrow			Ca	
Clay-colored Sparrow			Ca	
Lark Sparrow			Ca	
Black-throated Sparrow			Ca	
Savannah Sparrow	U		U	U
Fox Sparrow				R
Song Sparrow	C	C*	C	C
Lincoln's Sparrow	U		U	U
Swamp Sparrow				Ca
White-throated Sparrow			Ca	Ca
Golden-crowned Sparrow	U		U	U
White-crowned Sparrow	C		C	C
Harris' Sparrow	Ca			Ca
Dark-eyed Junco	U	R*	U	U
Bobolink			Ca	
Red-winged Blackbird	Ca		Ca	
Tri-colored Blackbird	R		R	R
Western Meadowlark	U	R	U	U
Yellow-headed Blackbird	Ca		Ca	

**Table 1. Bird Species Frequenting the Andree Clark Bird Clark Refuge**

<i>Species</i>	SEASON			
	<i>Spring</i>	<i>Summer</i>	<i>Autumn</i>	<i>Winter</i>
Brewer's Blackbird	C	C*	C	C
Brown-headed Cowbird	U	U*	U	U
Orchard Oriole			Ca	
Hooded Oriole	U	U	U	
Northern Oriole	R		R	
Purple Finch	R		R	R
House Finch	C	C*	C	C
Pine Siskin	R		R	R
Lesser Goldfinch	C	C*	C	C
Lawrence's Goldfinch	R		R	R
American Goldfinch	U	R	U	U
House Sparrow	C	C*	C	C

Key to Abbreviations

Seasons:

Spring – March 1 to May 31.  
 Summer – June 1 to July 31.  
 Autumn – August 1 to November 30.  
 Winter – December 1 to February 28.

Abundance:

C = Common; 5 or more individual birds per day.  
 U = Uncommon; 1 to 4 individual birds per day.  
 R = Rare; 1 to 5 sightings per season.  
 Ca = Casual; less than 5 sightings ever.

Breeding: \* Probably or definitely has nested in this area in the past 10 years.

Source: Paul Lehman.

**Table 2. Sensitive Bird Species Observed at the Andree Clark Bird Refuge (Lehman 1985)**

<i>Species</i>	<i>Status</i>	<i>Occurrence at Refuge and Likelihood of Impact</i>
California brown pelican	FE/SE/MNBMC	A casual visitor to the open water habitat. Will not be affected by proposed projects.
Double-crested cormorant (rookery site)	-/CSC/-	Common throughout year. Rookery present in eucalyptus trees near elephant pens and lagoon. May be affected by proposed projects.
American bittern	FSC/-/MNBMC	Rare visitor, unlikely breeder. Inhabits reeds and bulrush habitat. Will not be affected by proposed projects.
Least bittern	FSC/CSC/MNBMC	Rare visitor, historically bred in refuge. Inhabits bulrush habitat. Will not be affected by proposed projects.
Snowy egret (rookery)	FSC/-/-	Several individuals observed daily in refuge along water's edge and in bulrush habitat. Not known to breed in area. Rookery site will not be affected by proposed projects.
Wood stork	-/CSC/-	Extremely rare sightings. Will not be affected by proposed projects.
Osprey	-/CSC/-	Rare visitor to refuge, may occasionally forage over open water habitat. Will not be affected by proposed projects.
Sharp-shinned hawk	-/CSC/-	Rare visitor to refuge. May occasionally use trees for perches, rooting near refuge.
Cooper's hawk	-/CSC/-	Occasionally observed in refuge. May use trees near refuge for perches and roosting.
Merlin	-/CSC/-	Rare visitor to refuge. Will not be affected by proposed projects.
California gull (nesting colony)	-/CSC/-	Common at refuge. No nesting colony in area and will not be affected by proposed projects.
Least tern (nesting colony)	FE/SE/MNBMC	Rare visitor at refuge. No nesting colony in area and will, therefore, not be affected by proposed projects.
Vaux's swift	FSC/CSC/MNBMC	Extremely rare visitor to area. Will not be affected by proposed projects.
Costa's hummingbird (nesting)	FSC/-/MNBMC	Rare visitor, unlikely breeder. Nesting will not be affected by proposed projects.
Rufon's hummingbird (nesting)	-/-/MNBMC	Rare visitor, unlikely breeder. Nesting will not be affected by proposed projects.
Allen's hummingbird (nesting)	FSC/-/MNBMC	Uncommonly observed at refuge. Possible historically bred in area. Nesting will not be affected by proposed projects.
Red-breasted sapsucker (nesting)	FSC/-/MNBMC	Rare visitor, unlikely breeder. Nesting will not be affected by proposed projects.
Olive-sided flycatcher	FSC/-/MNBMC	Rare visitor. Will not be affected by proposed projects.

**Table 2. Sensitive Bird Species Observed at the Andree Clark Bird Refuge (Lehman 1985)**  
(continued)

<i>Species</i>	<i>Status</i>	<i>Occurrence at Refuge and Likelihood of Impact</i>
Willow flycatcher (nesting)	-/SE/-	Rare visitor to area, unlikely breeder. Nesting will not be affected by proposed projects.
Bank swallow	FSC/ST/-	Extremely rare visitor. Will not be affected by proposed project.
California thrasher	FSC/-/MNBMC	Several individuals observed daily in refuge. Nests in upland vegetation along edge of water.
Loggerhead shrike	FSC/CSC/MNBMC	A few individuals historically observed in refuge. May nest in upland shrubs in refuge.
Yellow warbler	-/CSC/-	A few individuals historically observed in refuge. Not recorded as being a breeder. Nests in willow wood land.
Summer tanager	-/CSC/-	Extremely rare visitor to refuge. Will not be affected by proposed project.
Lark sparrow	FSC/-/MNBMC	Rare visitor in refuge. Will not be affected by proposed projects.
Tri-colored blackbird	FSC/CSC/MNBMC	Rare visitor in refuge, not known to breed in area. Will not be affected by proposed projects.
<i>Notes:</i>		
FE	determined by U.S. Fish and Wildlife Service to be endangered	
SE	determined by California Department of Fish and Game to be endangered	
ST	determined by California Department of Fish and Game to be threatened	
FSC	Federal Species of Special Concern, formerly List 2 candidate species, an informal term with no legal protection and does not necessarily mean that the species will eventually be proposed for listing	
CSC	California Species of Special Concern	
MNBMC	determined by the USFWS to be a Migratory Nongame Bird of Management Concern	

## **Appendix A**

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### **NRCS Tree Preservation and Protection Measures**

**PRIMARY USE:** Used to preserve and protect trees.

**ADDITIONAL USES:** Used to stabilize the soil and prevent erosion, decrease stormwater runoff, moderate temperature, provide buffers and screens, filter pollutants from the air, supply oxygen, provide habitat for wildlife, and increase property values.

## TREE PRESERVATION & PROTECTION

**What is it?** Practices to preserve and protect desirable trees from damage during project development.

### Purpose

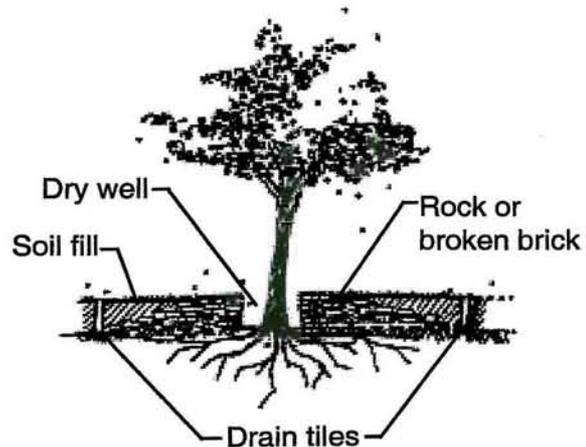
To preserve and protect trees that have present or future value for use in protection against erosion, for their landscape and aesthetic value, or for other environmental benefits.

Radiating pipes for supply of oxygen and nutrients



**Location of Radiating Pipes when Filling Around Existing Trees**  
Perspective View

Dry well  
Soil fill  
Rock or broken brick



"vertical tiles" that supply oxygen to the root system

**Tree Well Section View**

### Limitations

Some desirable characteristics to consider while selecting which trees should be protected include: tree vigor, tree species, tree age, tree size and shape, and use as wildlife food source.

### Materials

Barrier materials (i.e., fencing, timbers, and earthwork), flagging, pruning equipment, tree paint, peat moss/ moist topsoil, broken brick, gravel, perforated pipe, and filter fabric.

### Installation

Installation considerations should include areas of development sites containing trees or stands of trees.

Source: NRCS Planning and Design Manual, NRCS.

**TREE PRESERVATION & PROTECTION****Additional Considerations:****Planning Considerations**

Preserving and protecting trees and other natural plant groups often results in a more stable and aesthetically pleasing development. During site evaluation, note where valuable trees and other natural landscape features should be preserved and consider these trees and plants when determining the location of roads, buildings, or other structures.

Trees that are near construction zones should be either protected or removed because damage during construction activities may cause the death of the tree at a later time.

Trees should be considered for preservation for the following benefits:

1. They stabilize the soil and prevent erosion.
2. They reduce stormwater runoff by intercepting rainfall, promoting infiltration, and lowering the water table through transpiration.
3. They moderate temperature changes, promote shade, and reduce the force of wind.
4. They provide buffers and screens against noise and visual disturbances, thus providing a degree of privacy.
5. They filter pollutants and remove carbon dioxide from the air and produce oxygen.
6. They provide a habitat for animals and birds.
7. They increase property values and improve site aesthetics.

**Tree Selection Criteria**

Consider the following characteristics when selecting trees to be protected and saved:

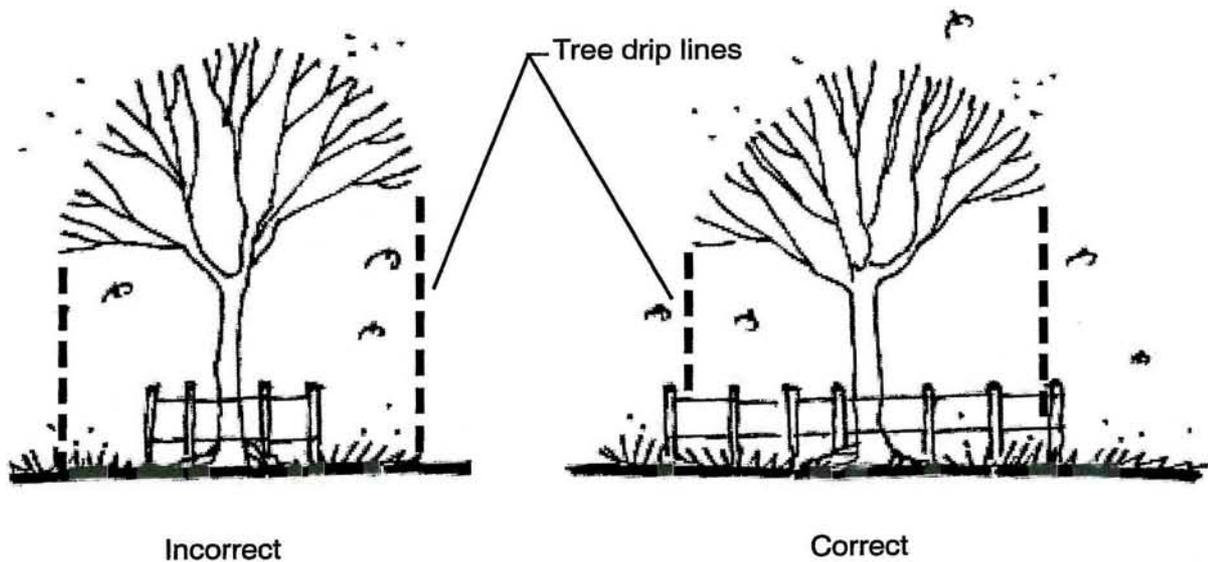
1. **Tree vigor.** Preserve healthy trees. A tree of low vigor is susceptible to damage by environmental changes that occur during site development. Healthy trees are less susceptible to insects and disease. Indications of poor vigor include dead tips of branches, small annual twig growth, stunted leaf size, sparse foliage, and pale foliage color. Hollow or rotten trees, cracked, split, or leaning trees, or trees with broken tips also have less chance for survival.
2. **Tree age.** Old, picturesque trees may be more aesthetically valuable than smaller, younger trees, but they may require more extensive protection.
3. **Tree species.** Preserve those species that are most suitable for site conditions and landscape design. Trees that are short-lived or brittle or are susceptible to attack by insects and disease may be poor choices for preservation.
4. **Tree aesthetics.** Choose trees that are aesthetically pleasing, shapely, large, or colorful. Avoid trees that are leaning or in danger of falling. Occasionally, an odd-shaped tree or one of unusual form may add interest to the landscape if strategically located; however, be certain that the tree is healthy.
5. **Wildlife benefits.** Choose trees that are preferred by wildlife for food, cover, or nesting. A mixture of evergreens and hardwood may be beneficial. Evergreen trees are important for cover during the winter months, whereas hardwoods are more valuable for food.

Construction activities can significantly injure or kill trees unless protective measures are taken. Although direct contact by equipment is an obvious means of damaging trees, the most serious damage is caused by root zone stress from compacting, filling, or excavating too close to the tree. Clearly mark boundaries to maintain sufficient undisturbed areas around the trees.

**TREE PRESERVATION & PROTECTION****Additional Considerations and Drawings:****Design Criteria**

The following general criteria should be considered when developing sites in wooded areas:

1. Leave critical areas (such as flood plains, steep slopes and wetlands) with desirable trees in their natural condition or only partially cleared.
2. Locate roadways, storage areas, and parking pads away from valuable tree stands. Follow natural contours, where feasible, to minimize cutting and filling in the vicinity of trees.
3. Select trees to be preserved before siting, roads, buildings, or other structures.
4. Minimize trenching in areas with trees. Place several utilities in the same trench.
5. Designate groups of trees and individual trees to be saved on the erosion and sedimentation control plan.
6. Do not excavate, traverse, or fill closer than the drip line, or perimeter of the canopy, of trees to be saved. See figure below for correct barrier placement.



Note: Barrier should be installed at the drip line of a tree's branches.

**Proper Fencing Around Existing Trees  
Elevation View**

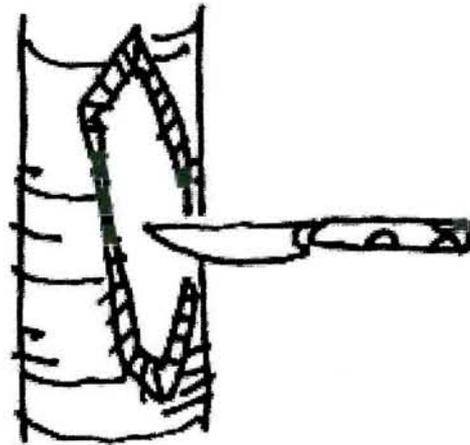
**TREE PRESERVATION & PROTECTION****Additional Considerations and Drawings:****Maintenance**

In spite of precautions, some damage to protected trees may occur. In such cases, repair any damage to the crown, trunk or root system immediately.

1. Repair roots by cutting off the damaged areas and painting them with tree paint. Spread peat moss or moist topsoil over exposed roots.
2. Repair damage to bark by trimming around the damaged area, tapering the cut to provide drainage, and painting with tree paint. See figure below.
3. Cut off all damaged tree limbs above the tree collar at the trunk or main branch. Use three separate cuts to avoid peeling bark from healthy areas of the tree. See following figures.



Tree wound



Trim and taper wound edge

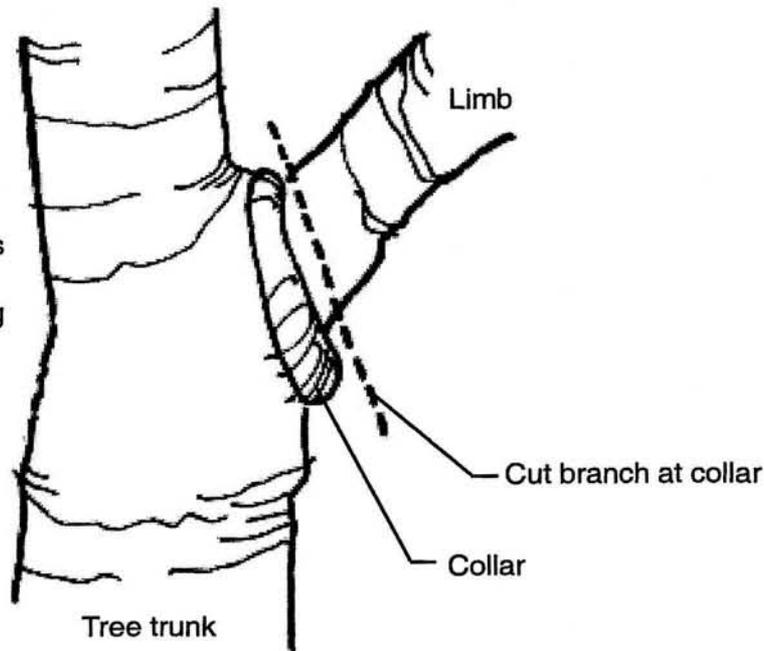
Note: Trim bark wounds with a tapered cut, then apply tree paint.

**Repairing Tree Bark Wounds  
Perspective View**

## TREE PRESERVATION & PROTECTION

### Additional Considerations and Drawings:

Note: Prune damaged branches at collar; more than one cut may be needed to avoid peeling bark when a limb falls.



**Proper Pruning of Damaged Branches  
Perspective View**

### Plans and Specifications

Plans for tree preservation and protection shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve the intended purpose. Plans shall identify the location of all trees to be preserved.

Specifications for tree preservation and protection shall use or be in conformance with the following: (Any variation from these specifications shall be approved by an engineer).

1. Place barriers to prevent the approach of equipment within the drip line of trees to be retained.
2. Do not nail boards to trees during building operations.
3. Do not cut tree roots inside the tree drip line.
4. Do not place equipment, construction materials, topsoil, or fill dirt within the limit of the drip line of trees to be saved.
5. If a tree marked for preservation is damaged, examine the damage to determine if repair is possible to preserve the tree. Provide repair in accordance with standard procedures outlined in the "Maintenance" section. Note: If the tree is damaged beyond repair, remove it and replace it with tree of the same or similar species - 2 in (51mm) diameter or larger - from balled and burlaped nursery stock when activity in the area is complete.
6. During final site cleanup, remove barriers around trees.