



NASA AMES DEVELOPMENT PLAN

FINAL PROGRAMMATIC

ENVIRONMENTAL IMPACT STATEMENT



APPENDIX F: BURROWING OWL HABITAT MANAGEMENT PLAN

NASA AMES RESEARCH CENTER

JULY 2002

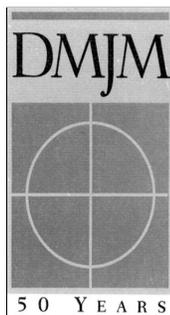


DESIGN, COMMUNITY & ENVIRONMENT

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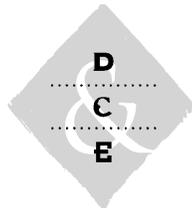
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Burrowing Owl Habitat Management Plan



Evaluation of Impacts to
Burrowing Owls and
Identification of Avoidance and
Mitigation Measures for the
NASA Ames Development Plan

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For PAI Corporation at NASA Ames Research Center
March 2001*

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1. INTRODUCTION

This document provides a general evaluation of potential impacts to burrowing owls (*Athene cunicularia hypugaea*) due to development proposed under the NASA Ames Development Plan (NADP) for Ames Research Center (ARC or the Center). NASA is proposing development of four areas to produce a "world-class, shared-use educational and R&D campus focused on astrobiology, life sciences, space sciences, nanotechnology, information technology, and aeronautics." As part of the NADP, NASA would "create partnerships with Federal, state, and local government agencies, universities, private industry and non-profit organizations in support of NASA's mission to conduct research on and develop new technologies."

The four development areas addressed in the NADP are shown in Figure 1 and are described below.

- **NASA Research Park (NRP)** is a 213-acre parcel located on the south side of the Center between the airfield and Highway 101. This parcel includes Shenandoah Plaza, and an area south of the plaza to Highway 101, and west of the airfield. The NASA Research Park (NRP) was the first area considered for development and was originally divided into 7 planning zones. Two zones were designated as non-developable lands: 3 acres in Shenandoah Plaza and 22 acres of owl habitat. The planning zones have changed substantially since the original planning phase, but the general layout of the NRP is the same and the 22 acres owl of habitat remains an important component of this planning area.

An analysis of impacts to burrowing owls from development of the 213-acre NRP was completed in December 1999 and will only be summarized in this document. For that analysis, see *Burrowing Owl Habitat Planning and Management for Moffett Field, Development Planning: Evaluation of Impacts to Burrowing Owls from Current Development Plans (213 acre study area)* dated December 1, 1999 (Trulio, 1999b). Four alternatives for developing the NRP were considered in that report. All alternatives included a protected Burrowing Owl Nesting Habitat Preserve of at least 22 acres in size. This Preserve was considered sufficient to protect most burrowing owl nesting habitat in the NRP and to provide the mitigation necessary to offset losses of owl nesting habitat due to development in NRP.

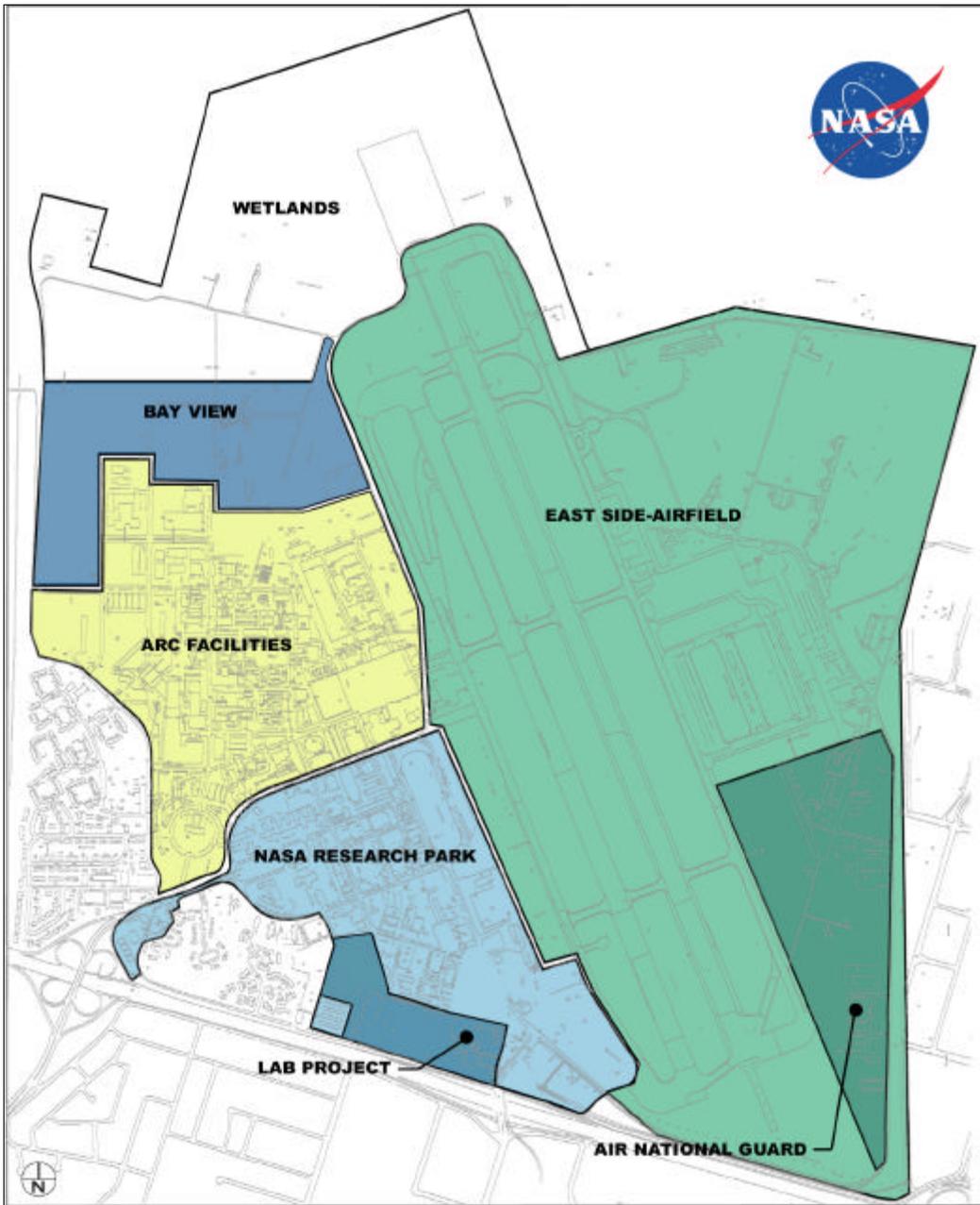


Figure 1

PROPOSED DEVELOPMENT AREAS

NASA AMES RESEARCH CENTER

- **East Side Airfield**, a 770-acre parcel, includes the airfield and lands east of the airfield. This area includes large tracts of open grassland between and at either end of the runways. This parcel also includes the Moffett Golf Course and a "fuel farm" south of the Golf Course, both of which are significant, long-term nesting areas for owls. The California Air National Guard (CANG) occupies approximately 110 acres of this area, but its activities will not be addressed in either the NADP or this document. Consequently, any future actions that could affect burrowing owls in the CANG parcel will be addressed in a separate environmental review process.
- **Ames Research Center Facilities** is a 210-acre parcel comprising the developed portions of the original Ames Research Center campus. Owls are found in open grasslands on the east and west sides of this parcel. On the east side of ARC Facilities, owls nest along Zook Road in the Vertical Take-off and Landing (VTOL) pad area, the soccer field, and just north of the fire station. On the west side, owls have traditionally nested in front of the 40' x 80' wind tunnel.
- **Bay View**, a 95-acre parcel, is located north of ARC Facilities. Most of this parcel is undeveloped grassland. While owls may forage in these grasslands, most owl nesting habitat is located on the east side of Bay View at the Outdoor Aerodynamics Research Facility (OARF) and VTOL pads and in short-grass habitat between the OARF pad and Zook Road.

As part of the environmental review process required by the National Environmental Policy Act (NEPA), NASA is evaluating five alternative development scenarios for the four planning areas. Table 1 provides a summary of the development levels proposed for each alternative in each area. Recognizing the important role of its lands in the survival of burrowing owls in the South San Francisco Bay region, NASA included protection of owl habitat in all of the development alternatives described in its Notice of Intent (NOI) to Prepare an Environmental Impact Statement (EIS) for the NADP. Consequently, protection of burrowing owl habitat is considered an integral part of ARC's development plans and its proposed action under NEPA.

The development alternatives are not analyzed separately. Rather, the impacts and mitigations provided apply to all the alternatives. Because the current development plans have not yet been refined, the impacts and mitigations described below are

inherently general. Consequently, additional environmental review under NEPA will be required for specific projects to determine their impacts, evaluate the significance of these impacts, and develop appropriate mitigation measures. The general mitigation measures provided below may be refined and applied as needed for specific projects.

The purpose of this report is to describe the measures that will be taken to avoid impacts to burrowing owls, evaluate and describe potential impacts that cannot be avoided, and recommend measures that would mitigate these impacts. *The avoidance and mitigation measures described below are expected to achieve long-term protection of the existing burrowing owl colony at the Center, given the development plans proposed in the NADP.*

This report begins with information on the regulatory requirements associated with burrowing owls, and then provides an overview of burrowing owl ecology and factors that may affect their survival and reproduction. This is followed by a description of existing conditions on the Center and the proposed development alternatives, an evaluation of potential impacts to burrowing owls associated with these alternatives, and recommended actions to mitigate these impacts.

Table 1. Summary of Square Footage Increases Proposed for Each Alternative.

	NRP	Ames Campus	Bay View	East Side Airfield
Alt. 1	No change	No change	No change	No change
Alt. 2	Add 2.0 M sq ft; Demolish 0.56 M sq ft; Renovate 0.5 M sq ft	No added sq ft; Renovate 0.5 M sq ft	Add 1.3 M sq ft	Add 0.55 M sq ft; Renovate 0.78 M sq ft
Alt. 3	Add 3. M sq ft; Demolish 0.56 M sq ft; Renovate 0.5 M sq ft	No added sq ft; Renovate 0.5 M sq ft	No added sq ft	No added sq ft; Renovate 0.78 M sq ft
Alt. 4	Add 1.6 M sq ft; Demolish 0.56 M sq ft; Renovate 0.5 M sq ft	No added sq ft; Renovate 1.5 M sq. ft.	Add 2.7 M sq ft	Add 0.67 M sq ft; Renovate 0.78 M sq ft
Alt. 5*	Add 2. M sq ft; Demolish 0.56 M sq ft; Renovate 0.5 M sq ft	Add 0.1 M sq ft; Renovate 0.4 M sq ft	Add 1.0 M sq ft	Add 12,000 sq. ft.

*Preferred Alternative

2. REGULATORY STATUS AND REQUIREMENTS FOR BURROWING OWLS

Burrowing owls and their nesting habitat are protected by federal law, as well as by state laws and codes. Burrowing owls are protected by the federal Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711), which makes it illegal to take, possess, buy, sell, or barter any migratory bird listed in 50 CFR Part 10, including feathers, other parts, eggs, nests or products. The species has no current status under the federal Endangered Species Act. In 1995, the owl was listed as a Category 2 candidate species, indicating population decline. However, in 1996, the U.S. Fish and Wildlife Service eliminated Category 2. The Service now considers species formerly listed in this category to be “Species of Concern” or “Species at Risk”, although these designations are not formally recognized under the Endangered Species Act.

At the state level, the burrowing owl was listed in 1978 by the California Department of Fish and Game (CDFG) as a Species of Special Concern, a category that has legal implications. As a special status species, the burrowing owl is protected from direct and indirect impacts to birds and nests by the provisions of NEPA. Because disturbing nesting owls is a significant impact, measures to avoid or reduce the impact must be identified.

California Department of Fish and Game Codes §3503, §3503.5, and §3800 also prohibit the take, possession, or destruction of birds, their nests or their eggs. To prevent take, project-related disturbances in active nest territories must be reduced or eliminated during the nesting season, February 1 to August 31. “Takings” include activities that cause nest abandonment, loss of reproductive effort, or loss of habitat necessary for owl survival and reproduction. Such activities would also violate the Migratory Bird Treaty Act.

Because of their semi-subterranean lifestyle, burrowing owls can go undetected and be inadvertently destroyed by ground-disturbing activities such as plowing, discing, soil stock-piling, or grading. Birds are often detected just prior to ground-disturbance, resulting in last-minute efforts to mitigate impacts to burrowing owls, including relocating birds out of development areas. Relocation attempts in which birds are captured and moved to new burrows far (e.g., miles) from their original nest sites are called “active relocations”. These attempts are often unsuccessful, as most birds disappear never to be seen again. Evicting birds from their nest burrows in development areas and allowing the birds to relocate to new burrows within approximately 300 feet of

their original burrow (“passive relocation”) has a higher probability of success. The 300-foot distance is usually within the birds' original nest burrow territory. In general, successful relocation is more likely the closer the new burrow is to the one that will be destroyed. State and federal laws require that relocations be done outside the nesting season. For more information on passive and active owl relocation, see the *Background Information Report on Burrowing Owls* (Trulio, 1999a).

To provide guidance on how and when to mitigate for impacts to owl nests and habitat, the CDFG issued the *Staff Report on Burrowing Owl Mitigation*, in 1995. The *Staff Report* (see Appendix) contains specific information on assessing impacts to owls and gives guidelines on developing mitigation. A few of the most important points are:

- Impacts to owls include disturbance within 160 feet of an occupied burrow, destruction of an active burrow, or destruction/degradation of foraging habitat within 300 feet of an occupied burrow.
- To avoid “take” under the Migratory Bird Treaty Act and CDFG Codes, disturbance of active nesting territories should be avoided during the breeding season, from February 1 to August 31.
- To avoid impacts, disturbances must be 160 feet from occupied burrows during the non-breeding season and at least 250 feet away during the breeding season.

3. BURROWING OWL ECOLOGY

The western burrowing owl (*Athene cunicularia hypugaea*) is a bird of open grassland habitats west of the Mississippi River to the Pacific Ocean. This 9-inch tall, brown and white bird is the only owl in the world that lives and nests underground. In the prairie west, the burrowing owl is commonly found in association with prairie dogs (*Cynomys sp.*). The owl lives in prairie dog burrows that it takes over from the dogs. In the South San Francisco Bay area, burrowing owls live in burrows that they appropriate from California ground squirrels (*Spermophilus beecheyi*), a close relative of the prairie dog. The owls do not live in same burrows with the squirrels, but they do live in active squirrel colonies. The presence of healthy squirrel populations is a critical habitat requirement of burrowing owls.

Owls also require large open tracts of grassland, with vegetation under about 9 inches in height. If vegetation becomes too tall or dense, owls tend to abandon their burrows. They prefer habitat with few or no trees, because trees provide perches for the larger birds of prey that kill burrowing owls. Typical burrowing owl predators in the South Bay include red-tailed hawks, Northern Harriers, barn owls, red foxes, skunks, snakes, and domestic cats.

Burrowing owls are year round residents of the Bay Area. They often use the same nest burrows year after year, a behavior known as site fidelity. These birds are also known for their site tenacity. Once they have chosen a nest burrow and begun nesting activities, it is very difficult to induce or force the birds to move to a new burrow.

Owls are monogamous for at least a season. They pair up as early as February and will choose a nest burrow soon after pairing. Eggs are laid between February and June. Chicks typically emerge from their burrows in May or June, although young can emerge as late as August. When they emerge, chicks are 2 to 3 weeks old. They are flying at about one month after emergence. In August or September, chicks molt into their adult plumage and the next spring they are full adults.

Burrowing owls eat large insects and small rodents. They have several methods of hunting, including running along the ground, hovering and diving, low flight, and diving from a perch. Owls often fly only a few feet above the ground as they move through their habitat. Recent research indicates that owls may forage up to three miles from their nest burrow in an evening (D. Rosenberg, pers. comm.). Approximately 95% of the owls' activity during the day in the breeding season occurs within 250 feet of their burrow (Haug and Oliphant, 1997).

4. FACTORS AFFECTING BURROWING OWL SURVIVAL & REPRODUCTION

A variety of factors can negatively affect the survival and reproduction of burrowing owls. Projects that significantly affect owls must develop measures to eliminate or reduce the severity of impacts to birds or their breeding activities.

- *Loss of nesting or foraging habitat.* Loss of habitat is a direct and significant impact to burrowing owls. Mitigation is required if nests will be destroyed or degraded or if foraging habitat will be eliminated or degraded.

- *Vehicle collisions.* Burrowing owl researchers have found that collisions with vehicular traffic can be a significant source of mortality in owl populations. In a study of owls in Canada, 37% of owl deaths were attributed to vehicle collisions (Haug and Oliphant, 1987).
- *Disturbance to burrows.* Human foot traffic, the presence of dogs, bicycle, motorbike, and car traffic, equipment placement, and other surface activities can disturb burrows. Owls may avoid traditional nest areas or abandon nests during the breeding season if the disturbance is too great .
- *Elimination of ground squirrels.* The elimination of ground squirrels either as an indirect effect of human activities or directly through squirrel eradication programs is a significant impact on burrowing owls. Owls may be killed in the process if they live in the squirrel colony. They may also be indirectly affected by the loss of the squirrels, whom they rely upon to dig and maintain burrows.
- *Loss of prey base.* Use of pesticides and herbicides will degrade owl foraging habitat by decreasing the amount and type of prey available to foraging owls. Since owls eat insects and rodents, management activities that significantly decrease the abundance of large insects or small rodents or their food may negatively affect the owls' ability to survive and reproduce.
- *Increase in predators.* Increasing the availability of perches, such as trees and tall poles, can increase the presence of predatory birds in owl habitat and have negative impacts on owls. New development can also increase numbers of cats and other predators that thrive in urban environments. Both domestic and feral cats are known to be significant predators of ground-dwelling birds.
- *Other forms of habitat degradation.* Pesticides, contaminants, and toxins may degrade owl habitat and increase mortality or decrease reproductive output. Allowing grasses to remain tall or weeds to invade a nesting area will degrade the area and may result in owls abandoning nesting sites.

5. EXISTING CONDITIONS AT ARC

NASA Ames Research Center is comprised of approximately 1510 acres of upland and 330 acres of wetlands. Originally, the site was occupied by both Ames Research Center and Naval Air Station (NAS) Moffett Field. NAS Moffett Field was established in 1930 and was operated by the U.S. Navy until 1994, when it was transferred to NASA under the Base Realignment and Closure Act. NASA is now the managing agency for the site and the entire property is known as Ames Research Center.

Over the years, federal ownership of the Center has resulted in the protection of these lands from public access and urban development. While the cities around ARC have converted large areas of open land, agricultural lands, and orchards to urban development, the Center has retained large amounts of its open spaces and habitats. As a result of this habitat protection, ARC now supports a wide range of common, declining, and rare species on its lands. While ARC's 330 acres of wetlands are well-known, valuable habitat for rare and endangered species, the over 440 acres of open, low elevation grassland at the Center represents another very important habitat that is becoming increasingly scarce in the San Francisco Bay region.

These open grasslands at the Center are occasionally or never mowed. Only the edges of these grasslands are regularly treated with biocides. The remainder receive spot treatments of pesticides and herbicides. These lands include the fields between and around the runways, the fields at and around the VTOL and OARF pads, and open fields on the west side of the Center. Other open lands include approximately 180 acres of recreational fields, including the golf course, soccer fields, and ballfields. While these sites are treated with fertilizers and biocides, their edges usually are not treated, which allows some use by grassland species.

These treated and unmanicured lands support a range of species including herbivores such as insects, voles, mice, ground squirrels, and jackrabbits. These species form part of the prey base for predatory birds such as loggerhead shrikes, kestrels, peregrine falcons, red-tailed hawks, red-shouldered hawks, and Northern Harrier. Grassland nesting birds, such as meadowlarks, horned larks and pheasants, are also supported by this habitat at the Center. In particular, open grassland areas at ARC support burrowing owls by providing nesting and foraging habitat.

Open grasslands in Santa Clara County are disappearing at a rapid rate as a result of urban development and this is reducing the burrowing owl population. In a survey of open grasslands in Silicon Valley occupied by burrowing owls in the early to mid-1980s, almost 60% had been developed by 1996 (Trulio, 1998). Grasslands are being lost rapidly throughout the U.S., as well. Analysis of breeding bird survey data from 1966-1996 by the Patuxent Wildlife Research Center found that grassland species showed consistent declines during this period. As this habitat is lost, species become rare. The western burrowing owl is one such grassland species that is declining nationwide.

Because it protects large tracts of grassland that provide nesting and foraging habitat, the Center supports a significant number of breeding and resident western burrowing owls. Most birds are resident year-round. From 1992-2000, 18-27 pairs of owls nested at ARC each year. The average breeding population during that time was 22 pairs of owls. From 1998-2000, an average of 25 owl pairs nested at ARC each year, with a range of 23-27 pairs. Table 2 and Figure 2 show the distribution of breeding owls at ARC from 1998-2000.

Table 2. Distribution of Breeding Owls (in pairs) at ARC, 1998-2000.

	NRP	ARC Facilities	Bay View	ESA (including CANG)	CANG only	Total
1998	6	4	2	15	5	27
1999	6	3	2	14	8	25
2000	4	2	2	11	6	23

The ARC subpopulation is the largest in the South Bay and constitutes approximately 25% of the region's population of 120 pairs of owls (Desante, 1995). Consequently, the Center is critical to the survival of burrowing owls in the region. The population of breeding pairs at the Center has been very stable over the past 8 years (Trulio, 1999a), indicating that the management of owls and their habitat has been beneficial to the birds.

More information on the ecology of burrowing owls at ARC can be found in the *Background Information Report on Burrowing Owls* (Trulio, 1999a).

6. FIVE DEVELOPMENT ALTERNATIVES FOR THE STUDY AREA

6.1 Proposed Action and Alternatives

NASA is considering five alternatives for development of the Center. These alternatives are as follows:

- *Alternative 1: No Action.* Maintain the Center as it is. Under this alternative, buildings could be renovated, but no new construction would occur. There would be no impacts to burrowing owls beyond current operations at the Center.
- *Alternative 2:* Add 2 million square feet of floor space within the NASA Research Park for R & D, offices, laboratory, educational housing, and/or training and residential conference facilities. Also, demolish 0.56 million square feet and renovate 0.50 million square feet in the NRP. Add 1.3 million square feet of new floor space to the Bay View area. Add 0.55 million square feet of new light industrial, R&D, office and educational facilities to the East Side-Airfield and renovate 0.78 million square feet. In the ARC Facilities area, renovate and replace approximately 0.5 million square feet. No new wind tunnels or increased aircraft operations are proposed. Protect existing burrowing owl habitat.
- *Alternative 3:* Add 3 million square feet of floor space within the NASA Research Park for R & D, offices, laboratory, educational housing, and/or training and residential conference facilities. Also, demolish 0.56 million square feet and renovate 0.50 million square feet in the NRP. No added floor space in the Bay View area or the East Side-Airfield. Renovate 0.78 million square feet in the East-side Airfield. In the ARC Facilities area, renovate and replace approximately 0.5 million square feet. No new wind tunnels or increased aircraft operations are proposed. Protect existing burrowing owl habitat.
- *Alternative 4:* Add 1.6 million square feet of floor space within the NASA Research Park for R & D, offices, laboratory, educational housing, and/or training and residential conference facilities. Also, demolish 0.56 million square feet and renovate 0.50 million square feet in the NRP. Add 2.7 million square feet of floor space to the Bay View area.

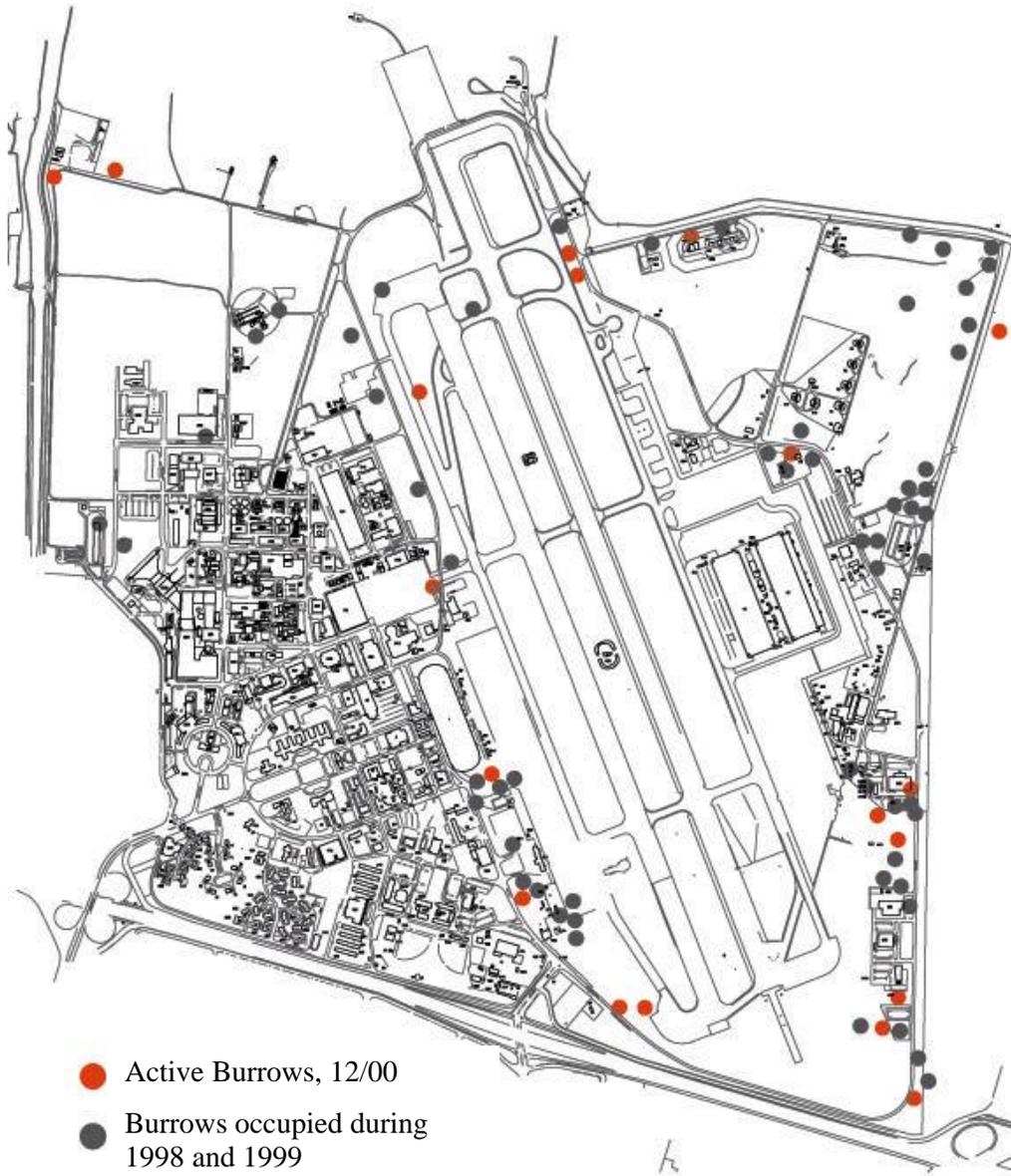


Figure 2: Locations of Owl Burrows, 1998-2000

Add 0.67 million square feet to the East Side-Airfield and renovate 0.78 million square feet. In the ARC Facilities area, no added floor space and renovation and replacement of approximately 1.5 million square feet. No new wind tunnels or increased aircraft operations are proposed. Protect existing burrowing owl habitat.

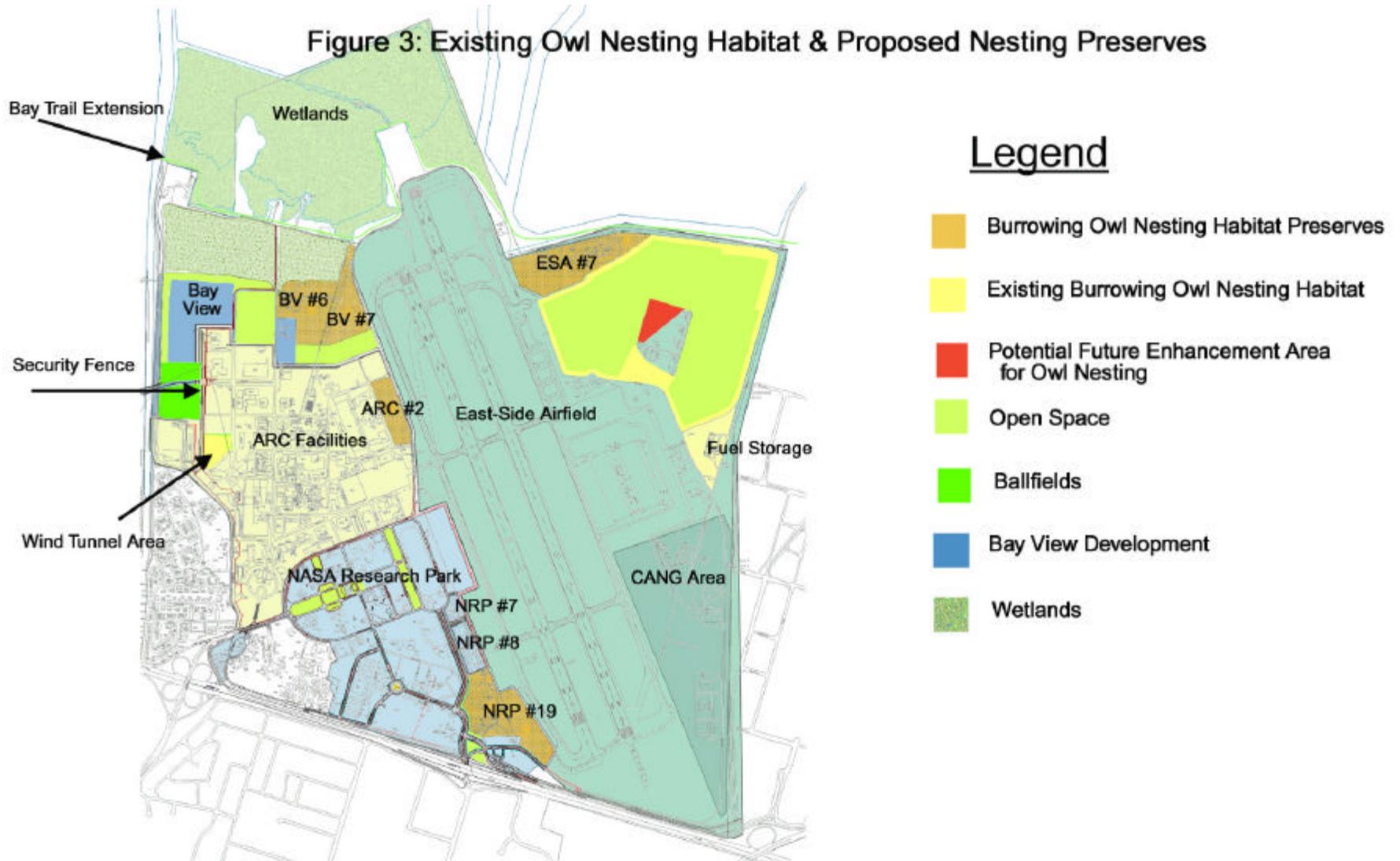
- *Alternative 5:* This is the Preferred Alternative. Proposed work includes addition of 2 million square feet of floor space within the NASA Research Park for R & D, offices, laboratory, educational housing, and/or training and residential conference facilities. Also, demolish 0.56 million square feet and renovate 0.60 million square feet in the NRP. Add 1.0 million square feet of floor space to the Bay View area. Add 12,000 square feet to the East Side-Airfield. In the ARC Facilities area, add 0.1 million square feet and renovate and replace approximately 0.4 million square feet. No new wind tunnels or increased aircraft operations are proposed. Protect existing burrowing owl habitat.

6.2 Protection of Burrowing Owl Habitat

Early in the planning process ARC recognized that if it did not accommodate burrowing owls, development could cause the loss or degradation of some or all of the nesting sites at the Center. Consequently, NASA included burrowing owl protection as an integral component of its development plans. Burrowing owl protection was noted in the NOI and it is considered part of ARC's proposed action under NEPA. ARC is implementing the concept of burrowing owl protection by including the establishment of several large Burrowing Owl Nesting Habitat Preserves (Figure 3) in all of the proposed alternatives in the EIS, except the No Action Alternative.

These Preserves constitute the most important element of ARC's effort to eliminate or reduce impacts to burrowing owls associated with its development plans. By establishing these Preserves and focusing development away from these areas, NASA is avoiding the majority of the significant, long-term impacts to most of the owl nesting sites in those areas.

Figure 3: Existing Owl Nesting Habitat & Proposed Nesting Preserves



The Preserves were created based on historical burrowing owls nesting areas on Center (Figure 2) and guidelines for burrowing owl habitat protection (*Staff Report on Burrowing Owl Mitigation*, 1995). Together, the four areas comprise 81 acres and are located in NASA Research Park (NRP Parcel #19, 22 acres), ARC Facilities (ARC Parcel #2, 8 acres), Bay View Area (BV Parcel #6, 12 acres; BV Parcel #7, 15 acres), and the East-side Airfield (ESA Parcel #7; 24 acres). These areas are shown on Figure 3

Figure 3 also shows areas on the Center, besides the Preserves, that currently provide nesting habitat for burrowing owls. These areas are referred to as “existing burrowing owl nesting habitat areas.” No impacts are expected in these areas because limited development is proposed in their vicinity. If future actions are proposed in these areas, beyond those currently envisioned in NADP Alternatives 1-5, additional environmental review will be required to evaluate impacts and determine appropriate mitigation measures. This could include the establishment of additional Preserves some time in the future.

7. POTENTIAL IMPACTS OF DEVELOPMENT ON BURROWING OWLS AND PROPOSED MITIGATION MEASURES

This section describes impacts to burrowing owls that are likely to result from the implementation of the development alternatives described above. Proposed mitigation measures to reduce or eliminate these impacts are then described. As noted in Section 6, by incorporating Burrowing Owl Nesting Habitat Preserves into its development plans, NASA has substantially reduced potential project impacts to burrowing owls. The impacts described in this section are those that may occur despite the establishment of these Preserves.

Since no new impacts would occur as a result of Alternative 1 (No Action), this analysis will apply only to the other four alternatives. Several caveats apply to this analysis. First, this analysis applies to development of the 213-acre NASA Research Park. However, a detailed analysis of the previous alternatives for development in that area was provided in Trulio (1999b) and will not be described in detail in this document. Second, no change in land use is proposed for the airfield and recommendations presented in this study are based on this assumption. If development or management changes were planned in the future for the airfield area, any impacts to burrowing owls would require mitigation *above and beyond* the mitigations presented in this document.

Moreover, the analysis presented here is constrained by the current generality of the descriptions of Alternatives 1-5, none of which include details of the proposed projects. Only potential impacts based on the current descriptions can be provided at this time. A full and complete impacts analysis, with quantified impacts, significance levels and specific mitigations, must await more complete project descriptions.

A full impact and mitigation analysis for burrowing owls will require at least this information:

- Amount, timing, and location of vehicle traffic;
- Number of people, their activities, timing of activities, and location;
- Specific project elements, features, and uses;
- Projected future projects, activities, and uses.

Finally, the following analysis addresses the four proposed development areas, *exclusive* of the 110-acre CANG parcel located within the East Side Airfield area. Owl nesting and foraging habitat exist within this parcel, and any impacts to owls or their habitat at CANG must be addressed in a separate environmental review process.

Given the current information, at least seven general impacts are likely as a result of implementing Alternatives 2, 3, 4, and 5. It is expected that impacts will intensify as development levels increase. All of these alternatives are likely to have significant or potentially significant impacts to owls and their habitat, as described below. Mitigation measures to lessen these impacts are also described.

Impact 1: Loss of birds.

Impact Description

Development of owl habitat can cause bird mortality if burrows are destroyed while birds are underground. Most of the proposed development would occur in areas that do not provide owl nesting habitat. However, development is planned for a portion of owl habitat located between Hangar 1 and the NRP Preserve (Parcel #19). This area, composed of NRP Parcels #7 and #8, is the only portion of the site where this impact could occur unless owls move into other areas that are proposed for development. This impact is considered potentially significant.

Avoidance/Mitigation Measures

If owls must be disturbed or if active burrows must be destroyed as a result of development, ARC should have a qualified owl biologist develop a plan to protect the owls or evict them from their burrows via passive relocation. Eviction must occur outside of the nesting season and before construction begins. ARC should have a qualified owl biologist develop plans to replace lost burrows at a 3:1 ratio in suitable habitat, if it is determined that this would improve habitat conditions. Plans should be submitted to CDFG before construction begins.

Level of Significance with Mitigation

Proper implementation of the proposed mitigation measure would greatly reduce the likelihood of this impact occurring. Consequently, with mitigation, this impact is considered less than significant.

Impact 2: Loss of habitat.

Impact Description

As noted in Section 6, ARC has established several Burrowing Owl Nesting Habitat Preserves. Moreover, the Center has identified other areas, not designated as Preserves, which currently provide burrowing owl nesting habitat (Figure 3). No development is proposed in any of these areas. Consequently, most of the potential impacts to owl nesting habitat have been avoided. However, NRP Parcels #7 and #8 are proposed for development and this constitutes the loss of some nesting habitat. Up to three pairs of owls have typically nested in this area in the past. This loss of nesting habitat is considered a significant impact.

In the ARC Facilities area, NASA is planning to create a softball field in the area just north of the 40' x 80'-foot wind tunnel. This area has often supported one or two pairs of nesting owls. The proposed use is considered compatible with the existence of burrowing owls on the site as long as owl habitat is planned as part of the ballfield and the ballfield is maintained in a manner that supports owl foraging and nesting. Consequently, the impact of creating a ballfield in this area is considered less than significant.

Besides nesting habitat, owls require large grasslands for foraging. Currently, approximately 950 acres of foraging habitat exist on Center: 440 acres of upland

grassland, 180 acres of recreational fields, and 330 acres of wetlands. The loss of foraging habitat, particularly in the currently undeveloped Bay View Area, could result in a decline of the owl population at the Center. The loss of foraging habitat is considered a long-term, potentially significant impact to burrowing owls.

Avoidance/Mitigation Measures

1. Besides avoiding impacts to owls currently nesting in the Preserve, establishment of the NRP Preserve will serve to mitigate impacts to the two or three pairs of owls that may be disturbed by development in NRP Parcels #7 and #8, near Hangar 1.

The configuration of the NRP Preserve that is now being proposed is not exactly the same as the Preserve described in Trulio (1999b). However, the size and general location of the proposed Preserve are very similar to the original Preserve. Currently, the proposed NRP Preserve has less habitat value than the original Preserve because part of it comprises a road, a motor pool and parking lots. However, once the proposed Preserve is restored to grassland and enhanced for use as owl habitat, its habitat quality will also be comparable to original Preserve.

To minimize impacts to burrowing owls, proper phasing of construction in NRP Parcels #7 and #8 with habitat restoration/enhancement of the NRP Preserve is very important. Restoration of the Preserve need not occur all at once. It may be phased to coincide with the timing and level of disturbance in these parcels. However, restoration and enhancement activities should always precede disturbances and complete restoration of the Preserve should be finished prior to full build-out of Parcels #7 and #8. Restoration activities and their phasing should be conducted under the guidance of a qualified owl biologist.

2. If nesting habitat or potential nesting habitat will be affected by development, ARC should survey all development areas in accordance with the CDFG *Staff Report on Burrowing Owl Mitigation*. If owls are found on site and they must be evicted, they should be evicted outside the breeding season in accordance with CDFG requirements. If owls must be evicted, at least 3 artificial burrows per owl pair or single bird should be installed in on-site areas enhanced for owl use if this is deemed appropriate by a qualified wildlife biologist. Burrows may also be installed in owl Preserves or existing owl habitat areas, if this is deemed acceptable by a qualified owl biologist.

3. If possible, ARC should design projects to retain burrowing owl nesting habitat and avoid evicting burrowing owls. Site designs intended to accommodate both

development and owl habitat should be developed in consultation with a qualified owl biologist. ARC should design landscaping in development areas to enhance owl use. This landscaping should consist of low growing, native vegetation. Trees should not be planted near owl habitat, and squirrels should be allowed to inhabit areas not used by people. Owl habitat should not be treated with biocides.

4. ARC should minimize impacts to foraging habitat by protecting as much open grassland as possible by minimizing the development footprint. To achieve this, buildings should be designed to be 3 to 4 stories tall. ARC should also implement a Transportation Demand Management program, including the use of multi-level parking structures to reduce the area covered by parking lots. Buildings adjacent to burrowing owl preserves should be designed to be three to four stories tall. ARC should locate new development adjacent to existing developed areas to minimize habitat fragmentation. Finally, construction impacts should be minimized by restricting the area available to equipment and as staging areas.

5. ARC should work with a qualified owl biologist to design the ballfields so they accommodate long-term burrowing owl nesting and foraging for one to two pairs of owls. ARC should minimize impacts during construction of the field (see Impact 3).

Level of Significance with Mitigation

With the mitigation, impacts to burrowing owl nesting are considered less than significant. Impacts to foraging habitat are reduced with mitigation and, are considered less than significant.

Impact 3: Disturbance to burrows

Impact Description

Project construction may result in short-term, temporary impacts to owl burrows. Construction in some areas, particularly in the NRP and the ARC Facilities area (during ballfield construction), may occur within 160 feet of owl burrows during the non-nesting season and within 250 feet during the nesting season. This short-term impact is considered significant.

Long-term, permanent burrow disturbance may occur as a result of more development next to owl habitat. More people are likely walk or ride through sensitive owl nesting areas. There will also be significant increases in public access and traffic. The number

of people expected to visit public attractions associated with the new development has not yet been quantified, but these people are expected to be an additional pressure on nesting and resident owls. Visitors may also bring dogs to walk in the open fields where the owls nest. These impacts are considered potentially significant.

Avoidance/Mitigation Measures

1. For construction areas near owl habitat, ARC should perform as much construction as possible outside of the breeding season, which typically runs from February 1 to August 31.

2. ARC should minimize impacts during construction by keeping as far from nesting areas as possible. If possible, ARC should provide a 160-foot buffer distance between occupied burrows and construction during the non-nesting season and a 250-foot buffer during the nesting season. If these distances cannot be met (e.g., development near the NRP Preserve), ARC should:
 - work with a qualified owl biologist to determine appropriate distances;
 - ensure that burrows are fenced off from construction areas;
 - provide owls the opportunity to move from their existing burrows by installing artificial burrows further from construction activities. These burrows should be installed prior to construction.

3. ARC should work with a qualified owl biologist to find routes for construction vehicles, construction staging areas, and other construction-related activities that will not impact owls or their burrows.

4. To avoid or mitigate for long-term impacts of more people near owl habitat, ARC should:
 - Fence off owl habitat areas with attractive fencing and low, native shrubs.
 - Design paths around the perimeter of the owl habitat to allow people to see the owls, but not disturb them. Do not plan paths or traffic patterns through owl habitat. Post educational signage to educate people about the burrowing owl and to help people understand the sensitive nature of the habitat.
 - Prohibit walkers, bikers and dogs from walking through the habitat.

- Monitor the areas for degradation associated with human use and implement further protective measures as needed.

Level of Significance with Mitigation

With mitigation, short-term impacts resulting from construction within 160 feet of an owl burrow outside of the nesting season and within 250 ft during the nesting season, are considered significant. With mitigation, the long-term impacts described under Impact 3 are considered less than significant.

Impact 4: Increased vehicle collisions

Impact Description

With development will come more vehicle traffic. More employees, visitors and delivery trucks will add more vehicles to the roads and increase the likelihood of burrowing owl mortality due to vehicle collisions. The amount and timing of the increased traffic has not yet been quantified for the Alternatives. Since owls are most active at night, the risk to owls is especially great from dusk on. If traffic volumes will be concentrated during the day, then risks to owls will be minimized. Increased traffic at night is likely to be a significant impact to owls.

Avoidance/Mitigation Measures

ARC should:

- 1) Post 25 mile/hour speed limit signs along roads next to owl habitat.
- 2) Route as much traffic as possible along roads away from owl habitats if significant increases in traffic will occur at night.
- 3) Plan new roads or other transportation corridors away from owl habitat and concentrate traffic in already developed areas, whenever possible.
- 4) Develop and implement a program to monitor traffic impacts to burrowing owls.

Level of Significance with Mitigation

With mitigation, these impacts are considered less than significant.

Impact 5: Destruction of ground squirrels

Impact Description

When sites are developed, landscaping is often managed to keep it free of ground squirrels. In addition, ground squirrel eradication may be implemented in open areas near new development because the squirrels are considered unsightly and a nuisance. However, an active ground squirrel population is an important element of owl preservation efforts. Because these colonial rodents are critical to the survival of burrowing owls in the South Bay, elimination of squirrel colonies can be a significant negative impact to burrowing owls. In addition, poisons used to kill squirrels may potentially kill burrowing owls, which is a significant impact.

Avoidance/Mitigation Measures

1. ARC should conduct no or minimal squirrel control in protected owl Preserves, enhanced owl habitat, or other areas used by owls.
2. ARC should allow squirrels to inhabit areas around new development that will not be used by people.
3. If squirrels must be controlled in landscaped areas, ARC should develop a squirrel eradication plan in conjunction with a qualified owl biologist. Squirrel eradication plans will require proper owl surveys, the use of squirrel control methods determined by the owl expert to be least risky to owls, and may require participation of the CDFG. These plans may also require the construction and maintenance of artificial owl burrows to replace natural squirrel burrows.

Level of Significance with Mitigation

With mitigation, these impacts are considered less than significant.

Impact 6: Decreased prey base

Impact Description

When new development occurs, building and grounds managers may want to eliminate local rodents and insects on and adjacent to the development. The burrowing owls' prey base of small rodents (mice and voles) and insects will be decreased if control methods are used in or near their habitat. This type of land management will have

negative impacts on owl survival and reproduction. These impacts are considered potentially significant.

Avoidance/Mitigation Measures

1. ARC should allow small rodent and insect control only directly around buildings and should not use biocides adjacent to owl habitat.
2. ARC should strictly limit, or completely avoid if possible, killing small rodents or insects in protected or enhanced owl habitat or other areas where owls nest and forage.

Level of Significance with Mitigation

With mitigation, these impacts are considered less than significant.

Impact 7: Increased predation

Impact Description

New development can increase predator pressure on burrowing owls by attracting birds of prey and increasing cat populations. Trees around new development will provide new perches for birds of prey. If these perches are near owl habitat, owls are put at risk. A common indirect effect of new commercial or residential development is an increase in the cat population. During the day, office workers may feed cats, which increases their numbers and strength and keeps them in the area. Cats are well-known predators of ground nesting birds and are a threat to burrowing owls. Other non-native species may also increase around developments as a result of being fed by office workers or finding a steady food supply in outside trash containers. These impacts are considered potentially significant.

Avoidance/Mitigation Measures

ARC should:

1. Prohibit employees from feeding wildlife, including cats.
2. Educate office workers and residents about the harm cats and other non-native predators do to native species.
3. Continue on-going efforts to control non-native predators in conjunction with U.S. Fish and Wildlife Service programs.
4. Not plant trees along roads adjacent to owl habitat or next to buildings near owl habitat.

5. Establish and enforce a “no pets” policy in housing developments on the Center.
6. Use trash receptors that cannot easily be opened by pest species.

Level of Significance with Mitigation

With mitigation, these impacts are considered less than significant.

8. MITIGATION MONITORING

These mitigation measures are designed to meet the letter of the laws, codes and guidelines for protecting burrowing owls. However, all mitigations should be reviewed by CDFG, the state agency with jurisdiction over burrowing owls. The approaches given here do not include physically moving owls to new locations off-site (“active relocation”). Instead, if burrows cannot be protected, owls are evicted from development areas and allowed to relocate to other burrows, perhaps those in the enhanced owl habitat. Based on the results of active relocation efforts undertaken by many researchers and personal observation, this "passive relocation" method is the best method for the owls for relocation. It is also much less expensive than "active relocation". Further information on this topic is found in the *Background Information Report on Burrowing Owls*.

Most of the mitigation measures described in Section 7 require monitoring to determine whether mitigation measures were implemented properly and to assess their effectiveness. ARC should develop and implement a burrowing owl monitoring program, to include at least the following:

- 1) Regularly survey owl location, abundance, and movement around the Center.
- 2) Study owl reproductive effort in the protected and enhanced owl habitat areas and around the Center.
- 3) Record impacts to owls from specific project(s).
- 4) Implement new mitigation measures to manage unforeseen impacts or impacts that are more intense than predicted.
- 5) Implement new habitat management measures devised by owl experts.
- 6) Record information on the timing, implementation, and effect of management methods and adjust them to meet owl needs in light of Center operation requirements.

- 7) Provide a yearly report to CDFG on the survival and reproduction of owls in the project areas in relation to the rest of the Center.
- 8) Study the movements of relocated/evicted owls to determine the effect of these mitigation measures on owl behavior.
- 9) Monitor the burrowing owl population change at NASA --including changes in adult and pair numbers, changes in chick production, and general mortality factors-- in relation to these parameters as measured for a reference owl population in Santa Clara County. The reference population will be determined for the preceeding 3 years based on population dynamics research conducted by a qualified ecologist.

If the NASA owl population or chick production (compared to the reference population) experiences a significant drop, either statistically or in the opinion of a qualified owl biologist, implement these further actions:

- i) Hire a qualified owl biologist to determine if the population decline is due to human impacts from development in the NADP and to determine the sources of population decline due to development in the NADP;
- ii) Implement actions and management activities designed by a qualified owl biologist with NASA to mitigate those sources of population decline and to return population levels to pre-NADP development levels;
- iii) Continue to monitor owl population dynamics to determine if the mitigation measures have been successful at stabilizing the population and increasing the population to pre-NADP development levels."

9. FUTURE MANAGEMENT OF BURROWING OWLS

None of the development proposed in the five alternatives will significantly impact owl nesting habitat in the East-side Airfield Area. Nonetheless, ARC has established a Preserve in this area (ESA Parcel #7 on Figure 3). In doing so, ARC will avoid impacts to two or three pairs of owls that *could occur* as the result of *future actions* that are not currently envisioned and are thus not part of the proposed action in the NADP. Moreover, this site could be actively managed and enhanced to provide potential mitigation sites for future, currently unplanned, actions in this area. That is, this preserve "pre-mitigates" for potential future impacts in this area.

While two or three owl pairs live in ESA Parcel #7 now, if these Preserves were enhanced and actively managed for burrowing owls, they could support *up to five pairs*

of owls. The mitigation potential of the Preserves depends on the number of pairs living there when mitigation is needed. For example, if three pairs of owls live in the Preserve at the time mitigation is needed, then two pairs could be mitigated for in the Preserve. If four pairs live in the Preserve, then one pair of owls could be mitigated for, *after* site enhancement.

If mitigation is required in the future, ARC should work with a qualified owl biologist to enhance the Preserves. This biologist should evaluate project impacts to burrowing owls and submit a habitat enhancement and owl mitigation plan to CDFG for review before impacting owls or their habitat.

The Golf Course, in its current land use, includes a recognized Burrowing Owl Nesting Habitat zone (Figure 3) in the 75-foot band around the perimeter of the course and including the Driving Range and Fuel Storage area just south of the Golf Course. ARC should preserve this important owl nesting habitat. No development is currently planned for this area. However, if this were to change, any impacts to nests on the Golf Course must be mitigated *above and beyond* the avoidance and mitigation measures presented in this study.

Currently, owl nests are protected around the Golf Course perimeter and squirrels are not controlled. Squirrel control on the rest of the Golf Course is conducted in coordination with the NASA Environmental Services Office to ensure owl protection. At this time, no changes in management are planned. If changes in management were to occur in the future, additional environmental review, and possibly mitigation, will be required. ARC should consider setting aside and enhancing other areas that are not currently owl nesting habitat to compensate for any losses of existing owl habitat beyond those associated with the NADP. Some possible habitat enhancement locations include the Ordnance Storage and the Fuel Storage areas (Figure 3) in ESA. In the ARC Facilities area, the gravel lots in front of the 40' x 80' foot wind tunnel could be converted to open grassland habitat for squirrels and owls.

The amount of area and type of enhancement required to compensate for lost habitat will depend on the quality of the habitat lost and the quality of the mitigation habitat. Habitat enhancement activities may include planting grasses, building artificial burrows, providing piles of dirt for squirrels to dig into, irrigating sections of the area to enhance the prey base, and mowing enhancement areas at least twice during the breeding season to keep the grass short for the owls. The precise enhancement habitat acreage and management will be determined when projects are

evaluated for their impacts to existing owl habitat. Siting and design of enhancement sites should be completed with the assistance of an experienced owl biologist. All mitigation plans should be submitted to CDFG.

10. REFERENCES

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11. APPENDIX

California Department of Fish and Game, *Staff Report on Burrowing Owl Mitigation, 1995.*

STAFF REPORT ON BURROWING OWL MITIGATION

Introduction

The Legislature and the Fish and Game Commission have developed the policies, standards and regulatory mandates to protect native species of fish and wildlife. In order to determine how the Department of Fish and Game (Department) could judge the adequacy of mitigation measures designed to offset impacts to burrowing owls (*Speotyto cunicularia*; A.O.U. 1991) staff (WMD, ESD, and Regions) has prepared this report. To ensure compliance with legislative and commission policy, mitigation requirements which are consistent with this report should be incorporated into: (1) Department comments to Lead Agencies and project sponsors pursuant to the California Environmental Quality Act (CEQA); and (2) other authorizations the Department gives to project proponents for projects impacting burrowing owls.

This report is designed to provide the Department (including regional offices and divisions), CEQA Lead Agencies and project proponents the context in which the Environmental Services Division (ESD) will review proposed project specific mitigation measures. This report also includes preapproved mitigation measures which have been judged to be consistent with policies, standards and legal mandates of the Legislature, the Fish and Game Commission and the Department's public trust responsibilities. Implementation of mitigation measures consistent with this report are intended to help achieve the conservation of burrowing owls and should compliment multi-species habitat conservation planning efforts currently underway. The *Burrowing Owl Survey Protocol and Mitigation Guidelines* developed by The California Burrowing Owl Consortium (CBOC 1993) were taken into consideration in the preparation of this staff report as were comments from other interested parties.

A range-wide conservation strategy for this species is needed. Any range-wide conservation strategy should establish criteria for avoiding the need to list the species pursuant to either the California or federal Endangered Species Acts through preservation of existing habitat, population expansion into former habitat, recruitment of young into the population, and other specific efforts.

California's burrowing owl population is clearly declining and, if declines continue, the species may qualify for listing. Because of the intense pressure for urban development within suitable burrowing owl nesting and foraging habitat (open, flat and gently rolling grasslands and grass/shrub lands) in California, conflicts between owls and development projects often occur. Owl survival can be adversely affected by disturbance and foraging habitat loss even when impacts to individual birds and nests/burrows are avoided. Adequate information about the presence of owls is often unavailable prior to project approval. Following project approval there is no legal mechanism through which to seek mitigation other than avoidance of occupied burrows or nests. The absence of standardized survey methods often impedes consistent impact assessment.

Burrowing Owl Habitat Description

Burrowing owl habitat can be found in annual and perennial grasslands, deserts, and arid scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat. Both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement.

Occupied Burrowing Owl Habitat

Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can be verified at a site by detecting a burrowing owl, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year (Rich 1984, Feeny 1992). A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

CEQA Project Review

The measures included in this report are intended to provide a decision-making process that should be implemented whenever there is potential for an action or project to adversely affect burrowing owls. For projects subject to the California Environmental Quality Act (CEQA), the process begins by conducting surveys to determine if burrowing owls are foraging or nesting on or adjacent to the project site. If surveys confirm that the site is occupied habitat, mitigation measures to minimize impacts to burrowing owls, their burrows and foraging habitat should be incorporated into the CEQA document as enforceable conditions. The measures in this document are intended to conserve the species by protecting and maintaining viable populations of the species throughout their range in California. This may often result in protecting and managing habitat for the species at sites away from rapidly urbanizing/developing areas. Projects and situations vary and mitigation measures should be adapted to fit specific circumstances.

Projects not subject to CEQA review may have to be handled separately since the legal authority the Department has with respect to burrowing owls in this type of situation is often limited. The burrowing owl is protected from "take" (Section 3503.5 of the Fish and Game Code) but unoccupied habitat is likely to be lost for activities not subject to CEQA.

Legal Status

The burrowing owl is a migratory species protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R. 21). Sections 3505, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs. To avoid violation of the take provisions of these laws generally requires that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle (February 1 to August 31). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) may be considered "take" and is potentially punishable by fines and/or imprisonment.

The burrowing owl is a Species of Special Concern to California because of declines of suitable habitat and both localized and statewide population declines. Guidelines for the Implementation of the California Environmental Quality Act (CEQA) provide that a species be considered as endangered or "rare" regardless of appearance on a formal list for the purposes of the CEQA (Guidelines, Section 15380, subsections b and d). The CEQA requires a mandatory findings of significance if impacts to threatened or endangered species are likely to occur (Sections 21001 {c}, 2103; Guidelines 15380, 15064, 15065). To be legally adequate, mitigation measures must be capable of "avoiding the impact altogether by not taking a certain action or parts of an action"; "minimizing impacts by limiting the degree or magnitude of the action and its implementation"; "rectifying the impact by repairing, rehabilitating or restoring the impacted environment"; "or reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action" (Guidelines, Section 15370). Avoidance or mitigation to reduce impacts to less than significant levels must be included in a project or the CEQA lead agency must make and justify findings of overriding considerations.

Impact Assessment

Habitat Assessment

The project site and a 150 meter (approximately 500 ft.) buffer (where possible and appropriate based on habitat) should be surveyed to assess the presence of burrowing owls and their habitat (Thomsen 1971, Martin 1973). If occupied habitat is detected on or adjacent to the site, measures to avoid, minimize, or mitigate the project's impacts to the species should be incorporated into the project, including burrow preconstruction surveys to ensure avoidance of direct take. It is also recommended that preconstruction surveys be conducted if the species was not detected but is likely to occur on the project site.

Burrowing Owl and Burrow Surveys

Burrowing owl and burrow surveys should be conducted during both the wintering and nesting seasons, unless the species is detected on the first survey. If possible, the winter survey should be conducted between December 1 and January 31 (when wintering owls are most likely to be present) and the nesting season survey should be conducted between April 15 and July 15 (the peak of the breeding season). Surveys conducted from two hours before sunset to one hour after, or from one hour before to two hours after sunrise, are also preferable.

Surveys should be conducted by walking suitable habitat on the entire project site and (where possible) in areas within 150 meters (approx. 500 ft.) of the project impact zone. The 150-meter buffer zone is surveyed to identify burrows and owls outside of the project area which may be impacted by factors such as noise and vibration (heavy equipment, etc.) during project construction. Pedestrian survey transects should be spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines should be no more than 30 meters (approx. 100 ft.) and should be reduced to account for differences in terrain, vegetation density, and ground surface visibility. To effectively survey large projects (100 acres or larger), two or more surveyors should be used to walk adjacent transects. To avoid impacts to owls from surveyors, owls and/or occupied burrows should be avoided by a minimum of 50 meters (approx. 160 ft.) wherever practical. Disturbance to occupied burrows should be avoided during all seasons.

Definition of Impacts

The following should be considered impacts to the species:

- Disturbance within 50 meters (approx. 160 ft.) which may result in harassment of owls at occupied burrows;
- Destruction of natural and artificial burrows (culverts, concrete slabs and debris piles that provide shelter to burrowing owls); and
- Destruction and/or degradation of foraging habitat adjacent (within 100 m) of an occupied burrow(s).

Written Report

A report for the project should be prepared for the Department and copies should be submitted to the Regional contact and to the Wildlife Management Division Bird and Mammal Conservation Program. The report should include the following information:

- Date and time of visit(s) including name of the qualified biologist conducting surveys, weather and visibility conditions, and survey methodology;
- Description of the site including location, size, topography, vegetation communities, and animals observed during visit(s);
- Assessment of habitat suitability for burrowing owls;
- Map and photographs of the site;
- Results of transect surveys including a map showing the location of all burrow(s) (natural or artificial) and owl(s), including the numbers at each burrow if present and tracks, feathers, pellets, or other items (prey remains, animal scat);
- Behavior of owls during the surveys;
- Summary of both winter and nesting season surveys including any productivity information and a map showing territorial boundaries and home ranges; and
- Any historical information (Natural Diversity Database, Department regional files, Breeding Bird Survey data, American Birds records, Audubon Society, local bird club, other biologists, etc.) regarding the presence of burrowing owls on the site.

Mitigation

The objective of these measures is to avoid and minimize impacts to burrowing owls at a project site and preserve habitat that will support viable owls populations. If burrowing owls are detected using the project area, mitigation measures to minimize and offset the potential impacts should be included as enforceable measures during the CEQA process.

Mitigation actions should be carried out from September 1 to January 31 which is prior to the nesting season (Thomsen 1971, Zarn 1974). Since the timing of nesting activity may vary with latitude and climatic conditions, this time frame should be adjusted accordingly. Preconstruction surveys of suitable habitat at the project site(s) and buffer zone(s) should be conducted within the 30 days prior to construction to ensure no additional burrowing owls have established territories since the initial surveys. If ground disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed.

Although the mitigation measures may be included as enforceable project conditions in the CEQA process, it may also be desirable to formalize them in a Memorandum of Understanding (MOU) between the Department and the project sponsor. An MOU is needed when lands (fee title or conservation easement) are being transferred to the Department.

Specific Mitigation Measures

1. Occupied burrows should not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist approved by the Department verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.
2. To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat (calculated on a 100 m {approx. 300 ft.} foraging radius around the burrow) per pair or unpaired resident bird, should be acquired and permanently protected. The protected lands should be adjacent to occupied burrowing owl habitat and at a location acceptable to the Department. *Protection of additional habitat acreage per pair or unpaired resident bird may be applicable in some instances.* The CBOC has also developed mitigation guidelines (CBOC 1993) that can be incorporated by CEQA lead agencies and which are consistent with this staff report.
3. When destruction of occupied burrows is unavoidable, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created (by installing artificial burrows) at a ratio of 2:1 on the protected lands site. One example of an artificial burrow design is provided in Attachment A.
4. If owls must be moved away from the disturbance area, passive relocation techniques (as described below) should be used rather than trapping. At least one or more weeks will be necessary to accomplish this and allow the owls to acclimate to alternate burrows.
5. The project sponsor should provide funding for long-term management and monitoring of the protected lands. The monitoring plan should include success criteria, remedial measures, and an annual report to the Department.

Impact Avoidance

If avoidance is the preferred method of dealing with potential project impacts, then no disturbance should occur within 50 meters (approx. 160 ft.) of occupied burrows during the nonbreeding season of September 1 through January 31 or within 75 meters (approx. 250 ft.) during the breeding season of February 1 through August 31. Avoidance also requires that a minimum of 6.5 acres of foraging habitat be *permanently* preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird. The configuration of the protected habitat should be approved by the Department.

Passive Relocation - With One-Way Doors

Owls should be excluded from burrows in the immediate impact zone and within a 50 meter (approx. 160 ft.) buffer zone by installing one-way doors in burrow entrances. One-way doors (e.g., modified dryer vents) should be left in place 48 hours to insure owls have left the burrow before excavation. Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily for one week* to confirm owl use of burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

Passive Relocation - Without One-Way Doors

Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily until the owls have relocated to the new burrows*. The formerly occupied burrows may then be excavated. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into burrows during excavation to maintain an escape route for any animals inside the burrow.

Projects Not Subject to CEQA

The Department is often contacted regarding the presence of burrowing owls on construction sites, parking lots and other areas for which there is no CEQA action or for which the CEQA process has been completed. In these situations, the Department should seek to reach agreement with the project sponsor to implement the specific mitigation measures described above. If they are unwilling to do so, passive relocation without the aid of one-way doors is their only option based upon Fish and Game Code 3503.5.

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