UCDAVIS

ARBORETUM HERON COLONY MANAGEMENT

Initial Study and
Mitigated Negative Declaration

The following Initial Study has been prepared in compliance with CEQA.

Prepared By:

OFFICE OF RESOURCE MANAGEMENT AND PLANNING

University of California
One Shields Avenue
376 Mrak Hall
Davis, California 95616

•

March 2009

State Clearinghouse No. 2009012037

Contact: A. Sidney England, Assistant Vice Chancellor for Environmental Stewardship and Sustainability
530-752-2432

TABLE OF CONTENTS

LIST OF FIGURES

UNIVERSITY OF CALIFORNIA **March 4, 2009**
Davis Campus

1 PROJECT INFORMATION

Project title:

Arboretum Heron Colony Management

Project location:

University of California, Davis
Yolo County

Lead agency's name and address:

Office of Resource Management and Planning
University of California
One Shields Avenue
376 Mrak Hall
Davis, CA 95616-8678

Contact person:

A. Sidney England, Assistant Vice Chancellor for Environmental Stewardship and Sustainability, 530-752-2432

Project sponsor's name and address:

See lead agency.

Location of administrative record:

See lead agency.

Note: Revisions to the Initial Study and Mitigated Negative Declaration
The proposed project remains unchanged from the project described in the January 16, 2009 Draft Initial Study and Negative Declaration. This version of the Initial Study Study/Mitigated Negative Declaration (dated March 5, 2009) includes updated text regarding the comments that were received during the 30-day public comment period, the comment letters and responses to the comments (in Appendix C), and minor text changes describing items such as the public comment period in the past tense rather than the present tense. Where changes have occurred to the Initial Study and Mitigated Negative Declaration, the format style of adding underline marking for additional text and strikeout marking for deleting the prior text has been used as shown on the following example:

Example of text changes:

"This Draft Initial Study ~~will be~~ was circulated for public and agency review from January 16, 2009 to February 17, 2009. Copies of this document ~~are~~ were available for review at the following locations:"

Changes were made (as indicated with underlined and strikeout text) in the following sections of this document: Section 2, Section 8, Appendix A, and Appendix C.

2 INTRODUCTION

2.1 INITIAL STUDY

Pursuant to Section 15063 of the California Environmental Quality Act (CEQA) Guidelines (Title 14, California Code of Regulations, Sections 15000 et seq.), an Initial Study is a preliminary environmental analysis that is used by the lead agency as a basis for determining whether an EIR, a Mitigated Negative Declaration, or a Negative Declaration is required for a project. The CEQA Guidelines require that an Initial Study contain a project description, description of environmental setting, identification of environmental effects by checklist or other similar form, explanation of environmental effects, discussion of mitigation for significant environmental effects, evaluation of the project's consistency with existing, applicable land use controls, and the name of persons who prepared the study.

2.2 PUBLIC AND AGENCY REVIEW

This Draft Initial Study ~~will be~~ was circulated for public and agency review from January 16, 2009 to February 17, 2009. Copies of this document ~~are~~ were available for review at the following locations:

- UC Davis Office of Resource Management and Planning in 376 Mrak Hall on the UC Davis campus
- Reserves at Shields Library on the UC Davis campus
- Yolo County Public Library at 315 East 14th Street in Davis
- Online at http://www.ormp.ucdavis.edu/environreview/

Comments on this Draft Initial Study ~~must be received~~ were due by 5:00 PM on February 17, 2009 and ~~can be~~ could have been e-mailed to environreview@ucdavis.edu or sent to:

John A. Meyer
Vice Chancellor - Resource Management and Planning
University of California
One Shields Avenue
376 Mrak Hall
Davis, CA 95616

During the comment period, comment letters were received from the following:

- Paul Kelly;
- Chad Roberts; and
- Yolo-Solano Air Quality Management District.

Paul Kelly and Chad Roberts provided comments indicating concern for the health of the heron and egret populations. The comments raised no new issues regarding the potential impacts to the herons and egrets and provided no new information regarding these species. The University carefully reviewed the comments provided in these letters, provided responses to each comment, and determined that no additional analysis for potential impacts was needed. The responses to the comments are provided in Appendix C of the Initial Study. Based on the information in the responses to comments (Appendix C) and in Section 6.4 (Biological Resources) of the Initial Study, no additional potential impacts are

anticipated beyond the impacts previously identified in the draft Initial Study that was made available for public review and comments on January 16, 2009.

The Yolo-Solano Air Quality Management District provided a comment letter stating that the air district had reviewed the Initial Study and had no comments on the proposed project. The comment letter is provided in Appendix C of the Initial Study.

2.3 PROJECT APPROVALS

As a public agency principally responsible for approving or carrying out the proposed project, the University of California is the Lead Agency under CEQA and is responsible for reviewing and certifying the adequacy of the environmental document and approving the proposed project. Approval of the proposed project has been delegated to the campus by The Board of Regents of the University of California (The Regents) and is expected to be considered by the campus' Facilities and Enterprise Policy Committee in ~~February~~ March, 2009.

2.4 RELATIONSHIP TO THE 2003 LRDP

The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove area of the UC Davis Arboretum. Accordingly, the proposed project is not related to campus growth, would not include additional growth at UC Davis, and does not implement the LRDP. The following CEQA Initial Study and Mitigated Negative Declaration include references to the 2003 LRDP and the 2003 LRDP EIR for incorporation of certain background materials and campus-specific information but these documents, for CEQA purposes, are not tiered from the 2003 LRDP EIR.

2.5 ORGANIZATION OF THE INITIAL STUDY

This Initial Study is organized into the following sections:

Section 1 – Project Information: provides summary background information about the proposed project, including project location, lead agency, and contact information.

Section 2 – Introduction: summarizes the Initial Study, the scope of the document, the project's review and approval processes, and the document's organization.

Section 3 – Project Description: includes a description of the proposed project, including the need for the project, the project's objectives, and the elements included in the project.

Section 4 – Environmental Factors Potentially Affected: identifies which environmental factors, if any, involve at least one significant or potentially significant impact that cannot be reduced to a less-than-significant level.

Section 5 – Determination: indicates whether impacts associated with the proposed project are significant, and what, if any, additional environmental documentation is required.

Section 6 – Evaluation of Environmental Impacts: contains the Environmental Checklist form for each resource area. This section also presents a background summary for each resource area, the standards of significance, and an explanation of all checklist answers.

Section 7 – Fish and Game Determination: indicates if the project has a potential to impact wildlife or habitat and if an associated Fish and Game filing fee would be paid.

Section 8 – References: lists references used in the preparation of this document.

Section 9 – Agencies and Persons Consulted: provides the names of individuals contacted in preparation of this document.

Section 10 – Report Preparers: lists the names of individuals involved in the preparation of this document.

Appendix A – ~~Proposed~~ Mitigated Negative Declaration: presents the ~~Proposed~~ Mitigated Negative Declaration for the project.

Appendix B- The Effect of the Herony on Oak Tree Health in Shields Grove.

Appendix C- Comments and Responses to Comments: provides the comment letters and responses to the comment letter.

3 PROJECT DESCRIPTION

3.1 REGIONAL LOCATION

The approximately 5,300 acre UC Davis campus is located in Yolo and Solano Counties approximately 72 miles northeast of San Francisco, 15 miles west of the City of Sacramento, and adjacent to the City of Davis (see Figure 1). The campus is comprised of four campus units: the central campus, the south campus, the west campus, and Russell Ranch. Most academic and extracurricular activities occur within the central campus. The central campus is bounded generally by Russell Boulevard to the north, State Route 113 (SR 113) to the west, Interstate 80 (I-80) and the Union Pacific Railroad tracks to the south, and A Street to the east. The south campus is located south of I-80 and north of the South Fork of Putah Creek. The west campus is bounded by SR 113 to the east, Putah Creek to the south, Russell Boulevard to the north, and extends approximately one-half mile west of County Road 98. The south and west campus units are contiguous with the central campus, and are used primarily for field teaching and research. The approximately 1,600 acre Russell Ranch portion of the campus lies to the west, separated from the west campus by approximately one and one-half miles of privately owned agricultural land. Russell Ranch was purchased in 1990 for campus uses including large-scale agricultural and environmental research, study of sustainable agricultural practices, and habitat mitigation. Russell Ranch is bordered roughly by County Road 96 on the east, Putah Creek on the south, Covell Boulevard on the north, and Russell Boulevard and privately owned agricultural land on the west and northwest.

3.2 PROJECT OVERVIEW

The UC Davis Shields Oak Grove contains a unique collection of oak species and hybrid oak trees. This collection is the UC Davis Arboretum's most prominent and scientifically important plant collection. The Shields Oak Grove is located south of Garrod Road at the west end of the UC Davis Arboretum and consists of approximately 7 acres of oak trees and lawn area as shown in Figures 2,3, and 4. The oak trees are primarily large, mature specimens with heights ranging from 20 to 35 feet and dense tree canopies reaching 20 to 50 feet in diameter.

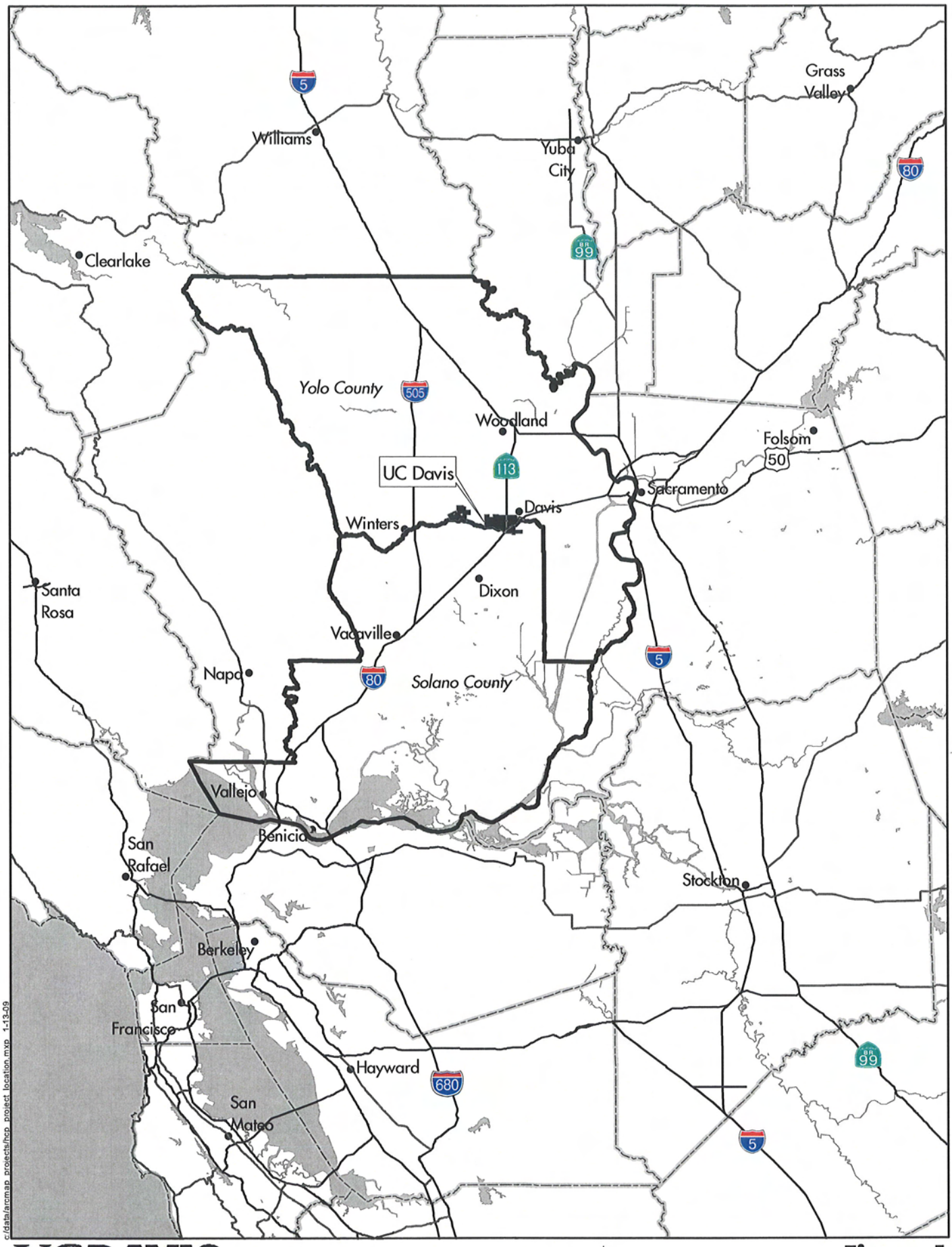
The Shields Oak Grove has been recognized as a collection of national significance by the North American Plant Collections Consortium and is considered the most unique oak collection in the United States (Collins 2006). The collection is a living museum exhibit and a resource for university teaching and research as well as a reference collection for professional arborists, urban foresters, and home gardeners. The Arboretum's significance as a living museum rests on the accessibility of the collections to educators, students, researchers, and visitors. The opportunity to walk and work among these magnificent oaks, to experience them directly through the senses and personal observation, is an essential component of their value.

Over the past decade, a heronry (a nesting congregation of colonial birds of the family Ardeidae), has become established in the Shields Oak Grove. By 2003 the heronry had grown large enough to raise concerns about the effect of the birds on tree health. Birds can damage trees by removing leaves, twigs and other foliage for nesting, and by depositing guano, which can reduce light absorption, burn leaves, cause defoliation, and alter soil chemistry. Arboretum managers were concerned not only about the effects of the birds on the trees, but also on visitor health and safety. Beginning in 2004, UC Davis instituted management techniques such as removal of vacant nests prior to arrival of the birds and the installation of a temporary fence keep members of the public away from the herons.

In addition to the on-going management activities described above, beginning in the 2009 nesting season, UC Davis proposes to employ a higher level of heron deterrence activities at the Shields Grove to reduce or prevent heron nesting. The new heron deterrence activities would include pyrotechnics (loud

explosions and loud whistles launched through the air with a glowing visual appearance), bio-acoustics (loud playback of bird distress calls), and handheld lasers (pointed at the birds). The use of frightening devices potentially will take place daily from March through July. Activities will primarily take place for two hours before and after sunrise and sunset as the birds arrive to prospect for suitable nest sites.

This heronry is comprised of four species, all of which have peak nesting at differing periods. The primary arrival of Black-crowned Night-Herons (*Nycticorax nycticorax*) begins in March, followed by both Great and Snowy Egrets (*Ardea alba, Egretta thula*) (April). Cattle Egrets (*Bubulcus ibis)* are the last to arrive usually by April 15th with the main thrust arriving in early May. The deterrence efforts will have to be sustained over several months and is expected to extend from March through July. The object of the deterrence efforts is to prevent birds from reaching the stage of egg laying in the nesting cycle. In order to comply with state and federal laws protecting colonial and migratory birds by preventing abandonment of nests with eggs (hereafter referred to as active nests) or chick mortality, no birds will be targeted by deterring efforts once they have laid eggs. Prior to the start of the project, a survey for nesting birds will be conducted on the project site and within a 500 foot area surrounding the project site to ensure that deterrence activities will not cause abandonment of any active nests on the site. Additionally, bird response will be monitored throughout the effort, and activities and schedules will be adjusted based on monitoring results. If an active nest is found, use of frightening devices and bio-acoustics (but not lasers) will be abandoned within 200 feet of the nest. This program would start in 2009 and continue indefinitely as needed to dissuade the heronry from forming in Shields Grove.



UC DAVIS
Office of Resource Management & Planning

0 5 10 20 Miles

N

Figure 1
UC Davis Location

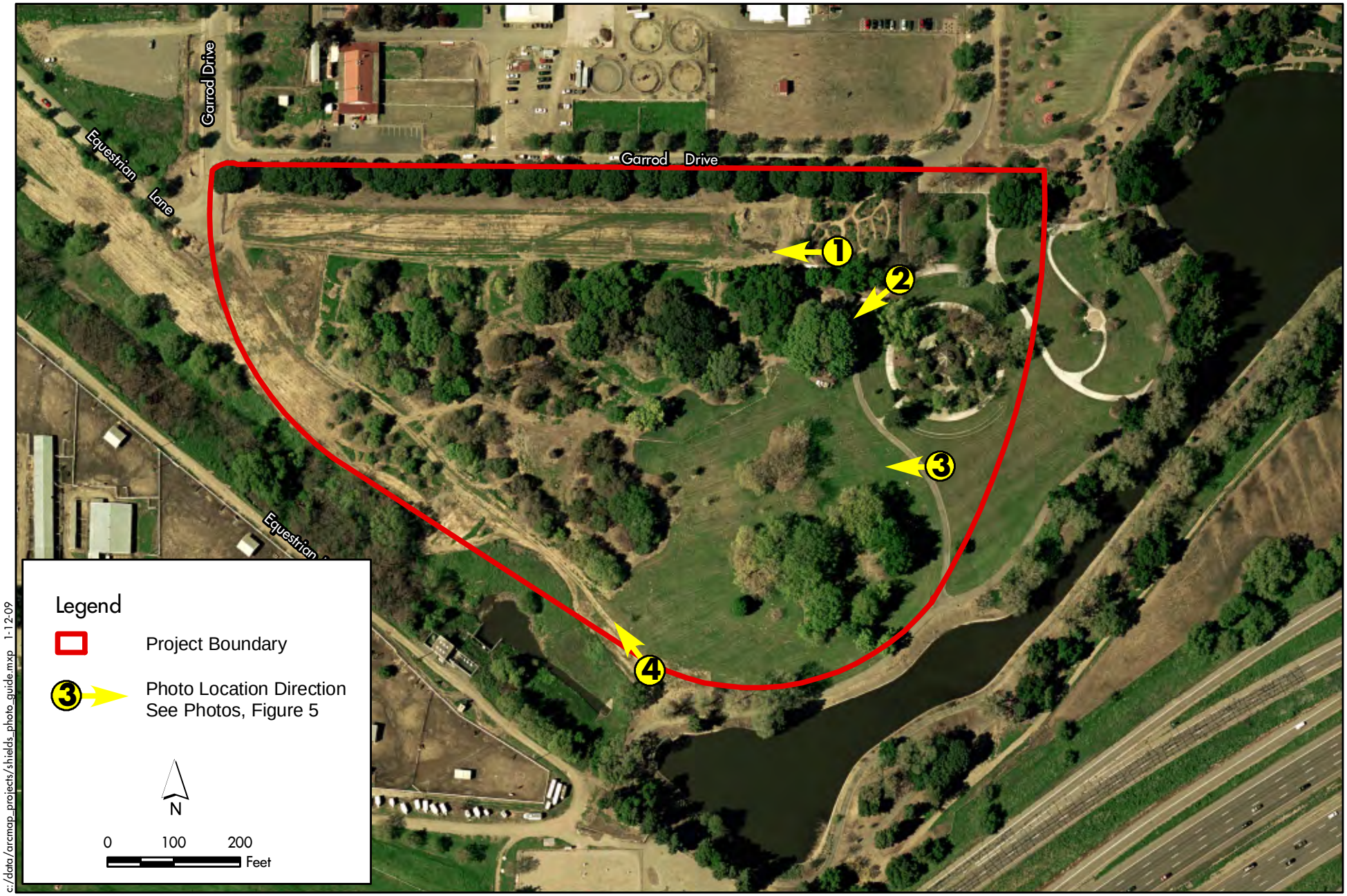
c:/data/arcmap_projects/shields_project_area.mxp 1-12-09

UCDAVIS
Office of Resource Management & Planning

Figure 2
Project Area and Surrounding Area

UCDAVIS
Office of Resource Management & Planning

Figure 3
Project Site



c:/data/arcmap_projects/shields_photo_guide.mxp 1-12-09

UC DAVIS
Office of Resource Management & Planning

Figure 4
Photo Guide


Photo 1: Northern Boundary of Shields Grove

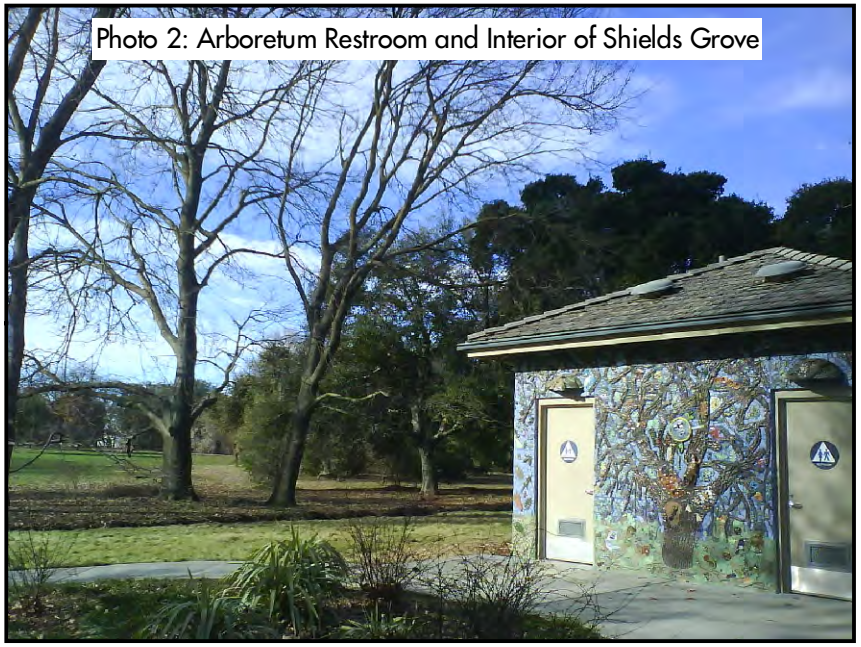


Photo 2: Arboretum Restroom and Interior of Shields Grove


Photo 3: Interior of Shields Grove


Photo 4: Southwest Boundary of Shields Grove

c:/data/arcmap_projects/shields_photos.mxp 1-12-15

UCDAVIS
Office of Resource Management & Planning

Figure 5
Shields Grove Site Photos

TABLE 1: SUMMARY OF MANAGEMENT ACTIVITIES IN SHIELDS OAK GROVE

Breeding Season	Habitat Modifications and Deterrence Actions	Monitoring Results	Arboricultural Practices
2004	• None	• First year of monitoring • Monitoring began mid-season • Peak active nest count **512** (recorded May 6, first day of monitoring)	• None
2005	• Structural pruning of trees	• Peak active nest count **631** (late April) • Peak black-crowned night-heron nest count **440** • Peak snowy egret nest count **83** • Peak cattle egret nest count **87** • Peak great egret nest count **21** • Cattle Egrets determined to be using Shields Grove as a roost with highest evening count of 643 birds	• Structural pruning of trees • Renovation of irrigation system in turf areas • Application of sulfur and iron chelate to treat for chlorosis in turf areas
2006	• Removal of remnants of previous years' nests • Reduction of twigs in understory • Mylar tape tied in canopy • 2 Mylar scare balloons flown over nesting area until eggs observed • Structural pruning of trees	• Peak active nest count **457** (late June) • Peak black-crowned night-heron nest count **256** • Peak snowy egret nest count **71** • Peak cattle egret nest count **126** • Peak great egret nest count **4** • No evening counts • Activity started later in season, most likely due to heavy spring rains – pattern seen in other heronries statewide • Mylar balloons observed to deter Great Egret nesting (early season species)	• Structural pruning of trees • Installation of new irrigation system in non-turf area of Oak Grove • Application of sulfur and iron chelate to treat for chlorosis in turf areas • Application of mulch in tree wells in turf area

Breeding Season	Habitat Modifications and Deterrence Actions	Monitoring Results	Arboricultural Practices
2007	• Removal of 11 crowding, redundant trees in nesting area • Removal of remnants of previous years' nests • Reduction of twigs in understory • Pruning to remove dead branches	• Peak active nest count **805** (late June) • Peak black-crowned night-heron nest count **261** • Peak snowy egret nest count **47** • Peak cattle egret nest count **488** • Peak great egret nest count **9** • No evening counts • Birds observed removing branches from trees for nesting materials	• Application of mulch in high density nesting areas • Pruning to remove dead branches in bird affected areas • Application of sulfur to treat for chlorosis in turf areas
2008	• Nest removal experiment in 15 trees in areas A and C of grove • Experimentation with handheld laser to deter nesting in area D – focus on prospecting cattle egrets	• Peak active nest count **866** (late June) • Peak black-crowned night-heron nest count **338** • Peak snowy egret nest count **65** • Peak cattle egret nest count **436** • Peak great egret nest count **27** • Nesting was greatly reduced in area D where laser deterrence was used • Late summer roost never formed	• Clearance pruning to improve maintenance access • Continued application of mulch in bare areas • Focus on weed and rodent control

2009 and future years (proposed)	• *Attempt to disperse colony using the following methods:*
	  o *Nest removal*
	  o *Handheld laser*
	  o *Distress calls*
	  o *Pyrotechnic dispersal devices*
	• *Cease deterrence activities when eggs are present*
		• Monitoring to start in March 2009.	***Proposed---***
			• *Structural pruning of trees*
			• *Application of sulfur to treat for chlorosis in turf areas*
			• *Continued application of mulch in bare areas*
			• *Focus on weed and rodent control*
			Additional Planned Activities---
			• *Commence construction of new pathway/trail.*
			• *Renovate irrigation in turf area.*

3.3 PROJECT SITE

The Shields Oak Grove consists of approximately 7 acres south of Garrod Drive at the west end of the UC Davis Arboretum (Figure 3). The site is entirely within UC Davis and is surrounded by land owned by UC Davis. The site consists of mature landscaping that is primarily managed as a scientific plant collection to fulfill the teaching, research, and public service mission of the university. Photos of the site and surrounding area are shown on Figure 5.

North of the project site is Garrod Road, a two-lane roadway providing motorized vehicle and bicycle access to the adjacent uses. North of Garrod Road is the UC Davis Health Sciences District a component of the UC Davis campus developed with extensive buildings and infrastructure for the medicine and veterinary medicine programs. Immediately north of Garrod Road are pastures used for animal holding for the veterinary medicine program. East and south of the project site is land developed for the UC Davis Arboretum and managed for the plant collection and public access to the plant collection. West of the site is a row of trees that separates the UC Davis Arboretum from the UC Davis Equestrian Center. The Equestrian Center includes horse boarding, training, and exercise facilities.

3.4 PROJECT BACKGROUND

Over the past decade, a heronry, (a nesting congregation of colonial birds of the family Ardeidae), has become established in the Shields Oak Grove on the UC Davis campus. By 2003 the heronry had grown large enough to raise concerns about the effect of the birds on tree health by caretakers of the oak collection. Birds can damage trees by removing leaves, twigs and other foliage for nesting, and by depositing guano, which can reduce light absorption, burn leaves, cause defoliation, and alter soil chemistry.

In 2004, the UC Davis Arboretum and UC Davis Museum of Wildlife and Fish Biology (MWFB) developed a partnership to begin examining the problem as part of a comprehensive wildlife management and enhancement plan for the arboretum. The MWFB team began monitoring the rookery to assess temporal patterns, species composition, nesting success, and other biological parameters. The team also researched a series of management options that could be used to reduce the impact of the herons on the oak collection and to reduce the size of the colony. Meanwhile, the arboretum staff worked on investigating the impact of the colony on tree health, soil chemistry, and other horticultural issues. Since the publication of the Arboretum Wildlife Management and Enhancement Plan in 2005, the MWFB has continued to partner with the Arboretum and has provided annual monitoring of the rookery, recording its growth, its changing species composition, and the influence of management actions on bird activities.

Shields Oak Grove contains a unique collection of oak species and hybrids and is the UC Davis Arboretum's most prominent and scientifically significant taxonomic collection. The Arboretum's oak collection has been recognized as a collection of national significance by the North American Plant Collections Consortium, and it is considered the most unique oak collection in the United States (Collins 2006). The collection is a living museum exhibit and a resource for university teaching and research as well as a reference collection for professional arborists, urban foresters, and home gardeners. Arboretum managers were concerned not only about the effects of the birds on the trees, but also on visitor health and safety.

3.4.1 Value of Shields Oak Grove at the UC Davis Arboretum

Shields Oak Grove consists of 304 oak trees, representing 87 species and varieties, from a wide geographic range, with an emphasis on arid-climate oaks from California, the western U.S., Mexico, and

the Mediterranean basin. Two-thirds of these specimens were planted at least 40 years ago; 85% were planted at least 20 years ago—these are full-sized, mature trees. Most of these trees were grown from acorns collected in the wild, and Arboretum curatorial records include information on where, when, and by whom they were collected and a detailed description of the site, conditions, and associated species of their native habitat.

The oak collection is the most prominent taxonomic collection at the UC Davis Arboretum in terms of number of specimens and size (acreage) of display, and is the most scientifically significant collection. The oak collection is used extensively as a resource for the teaching and research activities of the University, for public education and outreach, as a demonstration of regionally-appropriate horticulture, and for recreation (UC Davis 2008).

The oak collection and other taxonomic collections at the UC Davis Arboretum were formed to support the teaching and research functions of the University, and remain an important resource for researchers and educators. Sizeable collections of mature oaks are uncommon in botanic gardens due to space restrictions, the difficulty of propagating oaks vegetatively, their propensity for hybridizing, perishable seeds, and the fact that they may take decades to reach reproductive maturity. Due to the difficulty of obtaining living research materials from a broad sample of geographically distant plants within a taxonomic group, complex genetic, biochemical and ecological studies are often conducted on very limited research samples. The Arboretum's collection of slowly-maturing but long-lived oak species and the extensive documentation maintained on individual specimens are thus invaluable to scientists.

In 2007, the oak collection was recognized as a collection of national significance when it was named to the North American Plant Collections Consortium (NAPCC), a cooperative program of the American Public Gardens Association, the United States Department of Agriculture, and the United States National Arboretum that is dedicated to conserving plant diversity in the living collections of botanical gardens. Institutions participating in the NAPCC must commit to professional standards of collections management and make their plant collections available for selection and breeding, taxonomic studies, evaluation, and other research, teaching, and conservation work.

Recently, the oak collection has played a role in the fight against the devastating epidemic of the Sudden Oak Death pathogen now affecting wild oaks in California with specimens in Arboretum collection used in the research to understand the Sudden Oak Death pathogen.

The nation's other prominent collections of oaks are at arboreta of the east coast and the Pacific northwest. Many of the oaks of the arid southwest and subtropical Central America are not tolerant of moisture or cold-hardy enough to grow in these climates. The UC Davis Arboretum is the only institution in the southwestern United States with a large collection of mature oaks, and the collection is particularly strong in species from arid climates. The oak collection provides information on the ability of various species to thrive in the Mediterranean-type climate of California's Central Valley. The collection is a resource for introducing oaks of extraordinary horticultural merit into cultivation, and a testing ground for uncommon tree species to see what plants hold potential for our urban landscapes. Oaks tend to be deep-rooted, long-lived, and drought-tolerant, making them well-suited for stressful urban environments. The grove is a resource for arborists and urban foresters, where they can come see a diversity of oaks at their mature size and form. The grove serves as a demonstration and teaching planting of the growth, tendencies, and maturation process of each oak tree. Accordingly, the trees must be maintained at optimal health, in their natural, mature growth form to illustrate the characteristics of each tree.
The Arboretum oak collection includes specimens of several taxa identified as rare or of concern. Documenting propagation methods for these plants, displaying them to educate the public about their status, and encouraging their use in cultivation are all part of our efforts to ensure their continued survival.

The Arboretum's significance as a living museum rests on the accessibility of the collections to educators, students, researchers, and visitors as well as the health of the plants. The opportunity to walk and work among these magnificent oaks, to experience them directly through the senses and personal observation, is an essential component of their value.

Shields Oak Grove represents 40 years of investment by UC Davis—the time and effort required to collect these specimens from around the world, grow the trees from acorns, catalogue and maintain records on each specimen, prune, irrigate, control weeds and pests, and otherwise care for this outstanding collection. Additionally, the oak collection has been the focus of considerable Arboretum investment over the past several years. During that time the Arboretum has received a $250,000 gift to establish an endowment for the collection and $273,000 in grant funds for conservation work. UC Davis has completed a major collections analysis, a thorough conservation assessment of each tree in the grove, an extension of the existing irrigation system, pruning for improved structure, and specialized training for Arboretum staff in assessing risk and caring for mature trees. It is critical to maintain the oaks in Shields Grove in optimal health to ensure their longevity, preserve this campus investment, and maximize the long-term value of the investment for research and teaching.

3.4.2 History of Management Actions

Management actions taken to deter bird nesting and roosting are sometimes referred to as "hazing." These actions can be divided into passive and active techniques. Examples of passive techniques include habitat modifications that are made while the birds are not present (such as pruning or nest removal) and general visual deterrents that are installed on site (such as mylar strips, mylar balloons, or scarecrows). Active techniques are aggressive mechanized or human-controlled methods that are more targeted at the birds. Examples include auditory deterrents such as propane cannons, pyrotechnic devices, and recorded distress calls as well as visual deterrents such as strobe lights or hand-held lasers. Human presence is also considered to be an important active element.

Passive methods recommended in the Arboretum Wildlife Management and Enhancement Plan were tested in 2006 and 2007 to try to reduce the size of the colony. In 2006, all remnants of the previous years' nests were removed before the breeding season began and twigs were raked up in the understory to reduce nesting materials. Arborists tied mylar tape in the most heavily used nesting trees and flew two mylar scare balloons with large eye spots over the trees until the first eggs were observed. Structural pruning of trees that year also resulted in some canopy thinning and habitat modification in nesting trees. The peak active nest count was 457 in 2006, which was a significant decline from 631 nests the previous year. However, the unusually rainy spring weather that year may have contributed to the decline and was reported to have delayed heron rookery formation throughout the region.

In fall of 2006, the arboretum performed some tree removals in Shields Oak Grove that were needed for the health of the collection independent of colony management issues. Eleven low value crowding and redundant tree specimens were removed from the main bird nesting area, resulting in a major alteration to the canopy structure in that area. Formerly dense, closed canopy areas were opened up to some daylight, and the thinning was anticipated to make the area less appealing for nesting. Nest structure removal was repeated as was the reduction of twigs in the understory. Pruning that winter focused on removing dead branches in bird-affected areas. Following these habitat modifications that were intended to deter nesting, the peak active nest count in Shields Oak Grove reached an all-time high of 805 in 2007, up from 457 the previous year. Cattle egrets accounted for the majority of the increase in nesting activity, and made up more than half of the colony population. Birds were also observed pulling twigs from live trees for their nest-building in 2007, raising into question the value of reducing the availability of twiggy nesting materials in the understory.

Monitoring showed that the passive dissuading efforts undertaken in 2006 and 2007 were not effective at reducing the size of the rookery. In fact, the rookery significantly increased in size, due in large part to the arrival and rapid increase of Cattle Egrets in the colony. Based on these results, an active method of deterrence was tested in 2008. A small section of trees isolated from the rest of the grove were targeted with a handheld laser. The laser was targeted at prospecting Cattle Egrets in this area, and the method proved to be very effective resulting in no nesting attempts in the test trees. Despite the success of the laser in a portion of the grove, the 2008 peak active nest count grew from 805 in 2007 to 866 in 2008.

With the rookery continuing to increase in size, the UC Davis Arboretum horticulture staff has become increasingly concerned about the health of the trees. In fall of 2008, the decision was made to attempt to disperse the rookery in 2009.

Other efforts to remove rookeries have shown that one of the most effective approaches to reduce nesting of large concentrations of birds is by making the rookery site less attractive to birds. This is best accomplished by selectively cutting or pruning trees to open the stand 50-75%. The Arboretum attempted pruning in 2006 and 2007 with no appreciable effect (rookery size increased); and the care of the remaining trees remains the primary charge of the Arboretum, so continued clearing is no longer an option. Active bird deterrence using a variety of methods is recommended by most animal control studies and programs as the most effective remaining means to dissuade nesting.

3.5 PROJECT NEED AND OBJECTIVES

3.5.1 Project Need

The proposed project is a component of the oak tree management needs for the Shields Grove. The primary needs of the Shields Grove are to ensure the health of the oak trees and to allow public access to the oak trees for teaching and research purposes. The proposed project was developed in response to an increasing wildlife presence in the Shields Grove that is destructive to the trees and that could restrict public access because of health concerns of disease transmission from the herons.

3.5.2 Project Objectives

The objectives of the proposed project are to reduce or eliminate the presence of nesting herons in Shields Grove and to monitor the effectiveness of the efforts to dissuade the herons. Achieving these objectives would protect the health of trees and allow continued public access to the trees. By monitoring the success of the project, the project activities could be used in future years to protect the Shields Grove from heron damage or could be applied to other sites for similar wildlife management problems.

3.6 PROJECT ELEMENTS

The following section describes the activities proposed for the Arboretum Heron Colony Management Project.

3.6.1 Proposed Activities

Several methods are proposed to dissuade birds from nesting in Shields Oak Grove trees. Numerous studies have shown that keys to successful bird dispersal are timing, organization, persistence, and diversity. Timing is critical for initiating a rapid response following bird arrival and for performing

frightening activities at the time of day when they will be most effective. Good organization is necessary for coordinating personnel and acquiring sufficient equipment. Diversity refers to the use of a variety of techniques, whether in combination or in rotation, and frequently changing the type, timing, and location of the equipment. This variation helps prevent or delay the onset of habituation. Persistence refers to the motivation and perseverance of the personnel. To be successful, the operation must be diligently applied and yet at the same time it must be dynamic, creative, and mobile in response to the behavior of the birds.

This rookery is comprised of four species, all of which have peak nesting at differing periods. The primary arrival of Black-crowned Night-Herons begins in March, followed by both Great and Snowy Egrets (April). Cattle Egrets are the last to arrive usually by April 15th with the main thrust arriving in early May. Thus this effort will have to be sustained over several months. The object is to prevent birds from reaching the stage of egg laying in the nesting cycle. In order to comply with state and federal laws protecting colonial and migratory birds by preventing abandonment of nests with eggs or chick mortality, no birds will be targeted by deterring efforts once they have layed eggs. Two approaches are proposed to dissuade birds from returning to nest: 1) nest removal and site preparation; and, 2) the use of frightening devices to dissuade rookery development.

The earliest return to the rookery by herons has been March 1st, so all methods used to dissuade birds need to be ready before then. Active deterring methods will be carried out daily, seven days a week. Activities will primarily take place for two hours before sunset until one hour after sunset and for one hour before sunrise as the birds arrive to prospect for suitable nest sites. As described in section 3.2, a survey for nesting birds will be conducted on the project site and within a 500 foot area surrounding the project site to ensure that deterrence activities will not cause abandonment of any active nests. Additionally, bird response will be monitored throughout the effort, and activities and schedules will be adjusted based on monitoring results. If an active nest is found, use of frightening devices and bio-acoustics (but not lasers) will be abandoned within 200 feet of the nest. This program would start in 2009 and continue indefinitely as needed to dissuade the heronry from forming in Shields Grove.

Nest Removal and Site Preparation

Although nest removal has been undertaken in previous years as a passive method, the colony size has increased. The nest removal and site preparation techniques described here are an on-going management practice for the Shields Grove independent of the approval of the other deterrence activities that comprise the proposed project. If the proposed project is approved, the nest removal and site preparation activities, when used in concert with the active dissuasion techniques are expected to prove effective as a deterrence program. Several other attempts to dissuade rookeries in urban settings recommended that nest removal be completed prior to the use of active deterrence in order to change the setting from the previous breeding season(s). The activities could include the use of high pressure water and hand removal of nests and guano from trees in Shields Oak Grove. Hand removal will be completed by experienced and certified tree climbers. These will be provided by the Arboretum and/or contracted through a private company. Nest removal will be completed prior to the arrival of birds back to the rookery site in early March.

Site preparation will be required prior to starting any deterrence activities inside Shields Oak Grove. The Arboretum will provide a perimeter fence to prevent visitors from entering the colony and to minimize visitor disruption from deterrence program activities. Several signs will be posted along the fence that will provide information about the methods being employed to dissuade nesting, a rationale for their use, and contact information for arboretum staff. Fencing and signage will be established by mid-February in preparation for return of the birds by the first of March.

Frightening Devices
The use of multiple frightening devices can be extremely effective in manipulating bird concentrations because birds are much easier to frighten while they are flying. Once they have perched, a measure of security is provided by the protective vegetation and they become more difficult to frighten. Dispersal activities using this technique would end when birds stop moving after dusk. A continuation of frightening will only condition birds to the sounds and reduce responses in the future. Frightening efforts should commence as soon as the first birds are viewed arriving at the site. If the birds are allowed to become comfortable at their site, they will be more difficult to dislodge. The more diverse the techniques and coordinated the frightening efforts are, the more effective the use of frightening techniques will be. Once initiated, the efforts must be continued each day until success is achieved.

Frightening devices and techniques modify behavior and discourage birds from gathering at the potential nesting site. Many visual and sound-making devices are commercially available for scaring birds. Birds quickly habituate to repeated use of a single technique and so several must be undertaken. The proposed project includes the use of sound (pyrotechnics, distress call playback), light (hand held lasers and pyrotechnics), and human presence as the primary suite of activities in the Shields Grove.

Pyrotechnics
The use of pyrotechnics is part of most recommended actions and will require close coordination with campus fire and police departments. The proposed project includes the use of a suite of whistlers, exploding rockets and noise bombs will be used in coordination with other actions. Typically a loud exploding bird bomb is first used to scare the birds out of a tree and is followed by use of a whistler which emits both loud sound and light to frighten birds. Teams of three people will be employed to patrol the oak grove to ensure that birds cannot readily move from one site to another site within the grove. Use of the pyrotechnics will be random so birds cannot habituate. Team coordination will use hand held radios so devices can be used in concert and safely. In order to minimize visitor and campus disruption, the use of these devices will be restricted to the two hours before and after sunrise and sunset. These devices will launch bird bombs (projectiles shot and explode at the end of their 50-75 foot trajectory) and bird whistlers (which whistle and glow for 125 – 175 feet). These will be used in tandem as recommended by animal control experts. These devices produce sound levels up to 130 decibels at 3 feet (<100 decibels at 100 feet).

Bioacoustics
The project will utilize bioacoustic devices specifically designed for night-herons and cattle egrets. A single playback unit will be mounted on a small cart and driven randomly through the rookery, usually placed at one location for a period of time and moved. Some birds will eventually ignore any scaring device that is left in the same place or that emits sound in the same regular pattern over a long period of time. Bioacoustics have been found to be effective only if used in coordination with other methods. Sounds are broadcast by a microprocessor and output through high-fidelity speakers. The units available can be designed to cover from 1 to 6 acres. All have a control unit protected for all weather conditions, power source, amplifiers and speakers. The unit includes a pre-programmed chip that can be altered with a variety specific bird calls. The broadcast unit produces sound levels up to 110 decibels. In order to minimize visitor and campus disruption, the use of these devices will be restricted to the two hours before and after sunrise and sunset.

Hand Held Lasers
Although the majority of birds may be scared away initially by frightening methods, some individuals may ignore sound deterrents. These "hard-to-scare" individuals will be targeted with handheld laser light emission. Lasers represent the next step in bird control because of their effectiveness, silence, accuracy over distance, long range, safety, and ease of use. In 2007, a red laser was tested on prospecting Cattle Egrets and found it to be very effective in dissuading birds from nesting in selected trees. By using lasers

in avian dispersal, the operator is keying on vision, a primary and highly developed sensory pathway in birds. The repellent or dispersal effect of a laser is due to the intense and coherent mono-wavelength light that, when targeted at birds, can have substantial effects on behavior.

With birds in a tree, the laser is simply pointed into the tree, starting from the bottom and working up. The operator moves the laser back and forth while walking around the tree to make sure it is cleared - this is especially important with deciduous trees that contain dense foliage as it provides "hiding places" for the birds. The reflection of the beam spot off of foliage or even other birds is what frightens them away. It is not necessary to have the laser beam actually touch the birds to be effective (although there is no harm if it does). Once the roost is completely clear, the birds will not normally return that night. Field-testing has shown that 3 to 7 nights of using the laser to deny the desired roost has a substantial impact on subsequent daytime and nighttime population. A new green laser has been recently developed that may prove effective for even daytime use. Depending on bird response, it may be necessary to extend use of the lasers to additional daytime and nighttime hours during key periods of bird arrival. Details of the lasers are provided below.

- Red Laser. This unit is handheld and designed to be used between dusk and dawn. The laser is a class IIIb unit with output of 50mW. It operates on a laser wavelength of 650 nm. The use of this unit requires laser safety training certification by UC Davis Office of Environmental Health and Safety.

- Green Laser. This laser is a class IIIa unit with output of 4.99mW. It operates on a laser wavelength of 532mn. It is rated as 60 times more powerful than an equivalent red light laser and cam be effectively used during day-light conditions. Although safety training is not required for class IIIa lasers, all operators of these units undergo laser safety training certification by UC Davis Office of Environmental Health and Safety.

3.6.2 Safety Training

The MFWB will coordinate and track all safety training activities. All staff, students and volunteers will be trained in use and safety of all items employed at the rookery. Launchers and pyrotechnics will be used only by key staff and not students nor volunteers. Training for use and safety will be coordinated by the MFWB. All personnel will be required to complete a course on laser safety and become certified for working with and in proximity of hand-held lasers. Red lasers will be used by team leaders only. Green lasers can be used by volunteers and students. The bird guard speaker system will be mounted on a driving cart. Safety training for operation of this cart will be required for all personnel. Training will be undertaken as follows:

1. Use of Launcher and Pyrotechnics. Coordination of training will be by approved safety trainer in coordination with campus police and fire.
2. Laser Safety Training will be undertaken through the Office of Environmental Health and Safety
3. Vehicle safety will be coordinated with the UC Davis Arboretum

The value of Shields Oak Grove as a living museum exhibit and resource for research and teaching is dependent on visitor access to the trees. The UC Davis campus and UC Davis Arboretum are also responsible for minimizing known risks to the health and safety of visitors and employees. Birds and bird droppings may carry infectious diseases, which can be transmitted by touch or breathing contaminated dust. At the recommendation of Dr. Walter Boyce, wildlife veterinarian and co-director of the UC Davis Wildlife Health Center, the arboretum staff began fencing the most heavily used nesting areas in Shields Oak Grove in 2006 as a visitor safety precaution. Fencing has been erected annually from April to

October to prevent visitor contact with the birds and their guano since 2006. This restriction of visitor access compromises the main purpose of the oak collection as an accessible public resource and reference collection.

The most common zoonotic diseases associated with rookeries and roosts are Salmonellosis, Histoplasmosis, and West Nile Virus. Salmonella spp., the bacteria that causes salmonellosis, is harbored by live birds, bird carcasses and guano. To avoid transmission, visitors should practice good hygiene, avoid eating near the colony, and wear gloves when handling any bird-related materials in the grove. Histoplasmosis is a respiratory disease caused by inhalation of airborne fungal spores. Although these spores are commonly found in large heronries in humid areas, no cases of histoplasmosis have been reported in California. As a precaution, workers in the grove should wear masks at all times when disturbing guano and soil beneath the colony.

In 2005, MWFB staff collaborated with experts from the Sacramento-Yolo Mosquito and Vector Control District to test for West Nile Virus in the Shields Grove heronry. Of the seventeen birds caught in July and August, five tested positive for West Nile Virus antibodies. This testing was conducted late in the season, so few individuals were caught. Further testing is planned for the peak of the 2006 nesting season. West Nile Virus is a mosquito-borne disease, so visitors to the grove should wear long-sleeved shirts, long pants, and insect repellent containing DEET at all times.

3.6.3 Population

The proposed project would include no additional staff members and no changes to the campus student population.

3.7 SCHEDULE AND STAGING

The proposed project is anticipated to begin in March and extend as late as July 2009. The project activities would continue as needed in future years during the March to July period.

4 ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact” as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agricultural Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology, Soils & Seismicity
☐ Hazards & Hazardous Materials	☐ Hydrology & Water Quality	☐ Land Use & Planning
☐ Mineral Resources	☐ Noise	☐ Population & Housing
☐ Public Services	☐ Recreation	☐ Transportation, Circulation & Parking
☐ Utilities/Service Systems	☐ Mandatory Findings of Significance	

5 DETERMINATION

On the basis of the initial evaluation that follows:

☐ **I find that the proposed project WOULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.**

☑ **I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made that will avoid or reduce any potential significant effects to a less than significant level. A MITIGATED NEGATIVE DECLARATION will be prepared.**

☐ **I find that the proposed project MAY have a significant effect on the environment. An ENVIRONMENTAL IMPACT REPORT will be prepared.**

_____

John A. Meyer
Vice Chancellor – Resource Management and Planning

6 EVALUATION OF ENVIRONMENTAL IMPACTS

Introduction

During the completion of the environmental evaluation, the lead agency relied on the following categories of impact noted as column headings in the IS checklist:

- "Potentially Significant Impact" is appropriate if there is substantial evidence that the project's effect may be significant. If there are one or more "Potentially Significant Impacts" a Project EIR will be prepared.

- "Less Than Significant With Mitigation Incorporated" applies where the incorporation of project specific mitigation measures will reduce an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." All mitigation measures must be described, including a brief explanation of how the measures reduce the effect to a less than significant level.

- "Less Than Significant Impact" applies where the project will not result in any significant effects. The project impact is less than significant without the incorporation of mitigation.

- "No Impact" applies where a project would not result in any impact in the category or the category does not apply. "No Impact" answers need to be adequately supported by the information sources cited, which show that the impact does not apply to projects like the one involved (*e.g.*, the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (*e.g.*, the project will not expose sensitive receptors to pollutants, based on a project specific screening analysis).

6.1 AESTHETIC RESOURCES

6.1.1 Background

Section 4.1 of the 2003 LRDP EIR addresses the aesthetics effects of campus growth under the 2003 LRDP and provides additional information regarding aesthetic resources and the long-term planning for aesthetic resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth, and does not implement the LRDP.

Project Site

The project site at Shields Grove is part of the UC Davis Arboretum which is an area of UC Davis that includes mature landscaping, a scenic waterway, and is open for public access, enjoyment of the botanical specimens, and passive recreation.

6.1.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Have a substantial adverse effect on a scenic vista.

  A scenic vista is defined as a publicly accessible viewpoint that provides expansive views of a highly valued landscape. On campus, the open view across agricultural lands west to the Coast Range is considered a scenic vista. This vista is primarily viewed from public viewpoints along SR 113, Hutchison Drive, La Rue Road, and Russell Boulevard.

- Substantially degrade the existing visual character or quality of the site and its surroundings.

  For the campus, this standard is interpreted in terms of the effect of development under the 2003 LRDP on the valued elements of the visual landscape identified in the LRDP, or the effect associated with allowing incompatible development in or near areas with high visual quality such as Putah Creek and the Arboretum Waterway.

- Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

6.1.3 Environmental Checklist and Discussion

AESTHETICS Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☑
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☑
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☑	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☑

a,b,d) The proposed project does not involve any permanent alterations to the existing physical environment, is not located on a scenic vista, and would have no effect on scenic vista viewpoints. The trees located on the project will not modified or altered. The project is not near a state scenic highway and includes no sources of light or glare. No impact would occur.

c) The proposed project would include installation of a temporary fence in the Shields Grove area from March to July in order to prevent public access to Shields Grove during the heron nesting season so that the bird frightening devices can be used without conflicts with public users to the Arboretum. The fence would not block views of the Arboretum landscaping but it could temporarily degrade the visual character of the site. The impact would be temporary and would not prevent the public from viewing the Shields Grove area surrounding the Shields Grove. The potential impact would be less-than-significant and no mitigation measures are required.

Summary

The proposed project would not exceed the standards of significance for aesthetic resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.2 AGRICULTURAL RESOURCES

6.2.1 Background

Section 4.2 of the 2003 LRDP EIR addresses the agricultural effects of campus growth under the 2003 LRDP and provides additional information regarding agricultural resources and the long-term planning for agricultural resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth, and does not implement the LRDP.

Project Site

The project site does not include agricultural resources and is not adjacent to agricultural resources.

6.2.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Convert prime farmland, unique farmland or farmland of statewide importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency to nonagricultural use.
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland considered prime, unique, or of statewide importance to nonagricultural use.
- Conflict with existing zoning for agricultural use or a Williamson Act contract.

6.2.3 Environmental Checklist and Discussion

AGRICULTURAL RESOURCES Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☑
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☑
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?	☐	☐	☐	☑

a,b,c) The project site is landscaped area within land designated on the Farmland Mapping and Monitoring Program as Urban and Built-Up Land. No permanent changes to the physical

environment are proposed and the project would not impact any existing zoning for agricultural use near the project site. The site includes no agricultural resources. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for agricultural resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.3 AIR QUALITY

6.3.1 Background

Section 4.3 of the 2003 LRDP EIR addresses the air quality effects of campus growth under the 2003 LRDP and provides additional information regarding air quality resources and the long-term planning for air quality resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth, and does not implement the LRDP.

Project Site

The project site includes no sensitive receptors for air quality purposes.

6.3.2 Standards of Significance

The 2003 LRDP EIR considered the following Criteria Pollutant and Toxic Air Contaminants standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Since the adoption of the LRDP the campus has added an additional standard of significance for Global Climate Change in order to assess the potential contribution of the proposed project to greenhouse gas emissions that are resulting in global climate change. Based on these significance thresholds, a significant impact would occur if the project would:

Criteria Pollutants

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation. (According to the YSAQMD, emissions of NO_x and ROG in excess of 10 tons per year, PM_{10} emissions of 80 pounds a day, or CO emissions violating a state ambient air standard for CO would be considered significant.)
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

Toxic Air Contaminants

- Contribute to the probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeding the AB 2588 and Proposition 65 threshold of 10 in one million.
- Result in a noncarcinogenic (chronic and acute) health hazard index greater than the AB 2588 threshold of 1.0.

Global Climate Change

- Result in greenhouse gas emissions that would hinder or delay the ability to meet climate change goals set by the State of California via AB 32

6.3.3 Environmental Checklist and Discussion

AIR QUALITY Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☑
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☑
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☑
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☑
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☑
e) Result in greenhouse gas emissions that would hinder or delay the ability to meet climate change goals set by the State of California via AB 32?	☐	☐	☐	☑

a-e) The proposed project would include no air pollutant emissions and would not increase air emissions from motorized vehicles. The project would not include any odor producing activities and therefore, would not result in objectionable odors. The project would not include emissions of greenhouse gases and would have no effect on meeting the climate change goals set by the State of Californai via AB 32. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for air quality resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.4 BIOLOGICAL RESOURCES

6.4.1 Background

Section 4.4 of the 2003 LRDP EIR addresses the effects of campus growth under the 2003 LRDP on biological resources. The following discussion summarizes information presented in the 'Setting' subsection of Section 4.4 of the 2003 LRDP EIR.

The 5,300-acre campus is located in a region that is composed primarily of urban areas and agricultural lands that include remnant riparian areas. Habitat types on campus can be classified as Agricultural Lands (including Cropland/Pasture, and Orchard/Vineyard), Valley Foothill Riparian Woodland, Ruderal/Annual Grassland, Open Water Ponds, Riverine, and Urban Landscaping/Developed.

Project Site

The proposed project would occur within a small portion (approximately 7 acres) of the 5,300-acre campus and would not involve growth of the campus population or implementation of facilities growth related to the development planned for in the 2003 LRDP and evaluated in the 2003 LRDP EIR. The proposed project is a management action related to the Shields Grove collection of oak trees in the UC Davis Arboretum and the biological setting and potential effects of this specific action are described below.

Existing Conditions

The project site includes the Shields Oak Grove located south of Garrod Road at the west end of the UC Davis Arboretum (see Figures 2 and 3). The project site consists of numerous oak species and hybrids and lawn area as described above in section 3.2. Specifically, the site contains 304 oak trees, representing 87 species and varieties, from a wide geographic range, with an emphasis on arid-climate oaks from California, the western U.S., Mexico, and the Mediterranean basin. As described previously, the oak grove is currently being used as a large heron rookery comprised of four species—great egrets, snowy egrets, cattle egrets, and black-crowned night herons. In 2003 UC Davis Arboretum staff began working with local experts and researchers to study and document the effects of the rookery on the oak grove and found that the rookery had resulted in reduced health of the grove within the past 5 years. Details of these studies can be seen in Appendix b.

Methodology

The following information was reviewed in order to identify potential biological resource issues on the project site:

- a California Natural Diversity Database (CNDDB) records search of the Davis, Merrit, Clarksburg, Dixon, Grays Bend, Sacramento West, Saxon, Taylor Monument, and Woodland USGS topographic quadrangles (CNDDB 2008);
- a California Native Plant Society (CNPS) 2008 online *Inventory of Rare and Endangered Plants of California* (CNPS 2008);
- a U.S. Fish and Wildlife Service (USFWS) list of endangered and threatened species that may occur in or be affected by projects in the Davis and Merritt USGS topographic quadrangles and in Yolo County (USFWS 2008);
- UC Davis Long Range Development Plan (UC Davis 2003);

- UC Davis Long Range Development Plan EIR (UC Davis 2003f);
- Arboretum Wildlife Management and Enhancement Plan (UC Davis 2006);
- City of Davis General Plan, December 2007 (City of Davis 2007);
- unpublished reports and studies on file at UC Davis;
- ICF Jones & Stokes file information, including information from projects in surrounding areas; and
- Consultation with local biologists and resource experts to obtain information on the distribution and abundance of herons and heron rookeries in the vicinity of the proposed project.

Special-Status Species

Special-status species are plants and animals that are legally protected under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA), or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. The 2003 LRDP EIR defines special-status species to be those taxa that are: (1) listed as threatened or endangered under either the California or Federal Endangered Species Acts; (2) candidates for either state or federal listing; (3) species afforded protection under the Fish and Game Code of California; (4) federal and California Department of Fish and Game (CDFG) "Species of Special Concern"; (5) CDFG "Species of Special Concern" highest and second priority lists; or (6) California Native Plant Society (CNPS) List 1-3 plants.

Special-status plants and animal species discussed in this document fall within these categories with the exception that the U.S. Fish and Wildlife Service no longer maintains a list of federal species of special concern .

A review of CNDDB and USFWS species lists identified 4 special-status invertebrates, 3 special-status amphibians, 2 special-status reptiles, 13 special-status birds, and 4 special-status mammals that have the potential to occur on the project site or within the project vicinity (a 10-mile radius of the project site). Table 6.4.1 of the LRDP EIR lists these species and includes their status, geographic distribution, habitat requirements, and potential for occurrence on the project site. A number of these species are known to occur on campus or in the vicinity of campus, including: valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*; VELB), California tiger salamander (*Ambystoma californiense*), giant garter snake (*Thamnophis gigas*), western pond turtle (*Actinemys marmorata*), western burrowing owl (*Athene canicularia*), Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus cyaneus*), white-tailed kite (*Elanus leucurus*), tricolored blackbird (*Agelaius tricolor*), loggerhead shrike (*Lanius ludovicianus*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), and western red bat (*Lasiurus blossevillii*).

No elderberry shrubs, the host plant for VELB, are located within the project site, and therefore, VELB would not occur on the project site. Elderberry shrubs are scattered throughout the campus and along portions of Putah Creek adjacent to the campus but none of these shrubs are known to be occupied.

Although seasonal wetlands or ponds that could potentially support California tiger salamander occur in the vicinity of the campus, they do not occur on the project site. Therefore, suitable habitat for this species does not occur on the project site. California tiger salamanders have never been reported on campus. The closest recorded occurrences are for an individual salamander found in a field near Pole Line and Anderson Roads in the mid-1990's and a1993 occurrence approximately 1.5 miles northwest of

Russell Ranch (UC Davis 2003f). Since no salamanders have been observed on or adjacent to the campus, this species is not expected to occur on the project site.

Western pond turtle is known to occur on campus in the Arboretum Waterway and along Putah Creek but the project site does not contain habitat that would support this species. Therefore, this species does not occur within the project site.

Giant garter snake is known from a 1976 occurrence along Putah Creek approximately one mile from the project site. However, no habitat capable of supporting this species occurs within the project site or the surrounding campus (UC Davis 2003f). Therefore, this species does not occur within the project site.

Northern harrier is known to utilize agricultural fields on campus for foraging but is not expected to occur within the project site due to the absence of suitable foraging and nesting habitat.

Pallid bat, Townsend's big-eared bat, and western red bat, have some potential to use trees within the project site for temporary cover but due to the current level of disturbance at the site associated with regular maintenance of the grove and the presence of a large rookery during the breeding season it is unlikely that these species would roost within the project site.

The project site has potential to support the following species—western burrowing owl, Swainson's hawk, white-tailed kite, and loggerhead shrike—for which suitable habitat exists.

Non-special-status migratory birds and raptors also have the potential to nest in the project site. Although these species are not considered special-status species, their occupied nests and eggs are protected under California Fish and Game Code (CFGC) Section 3503 or 3503.5 and the Migratory Bird Treaty Act (MBTA). The heron rookery currently using the grove as a roost site is afforded protection under these regulations from activities that would cause death of an individual animal.

Twelve special-status plants and 5 special-status fish were also determined to have potential to occur within a 10-mile radius of the project site. One special-status plant species, North California black walnut, is known to occur on campus but occurs only as a planted horticultural tree and does not occur within the project site. The project site is not known to contain special-status plants and does not contain habitat capable of supporting special-status plants whose geographic range includes the project site. One special-status fish, fall/late-fall run Chinook salmon, is known to occur within the campus in lower Putah Creek over a mile from the project site, and the project site does not include any creeks or other waterbodies. Plants and fish are not included in Table 6.2.1 in the LRDP EIR because there is no suitable habitat for these species on the project site and no potential for impact.

6.4.2 Standards of Significance

The following standards of significance are considered appropriate for the proposed project and are based on the standards of significance established in the 2003 LRDP EIR. The project would result in a significant biological resource impacts if it would:

- Result in a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS.
- Result in the "take" (defined as kill, harm, or harass) of any listed threatened or endangered species or the habitat of such species.

- Result in a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS.
- Result in a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, or coastal wetland) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish, or wildlife species or with established native, resident, or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any applicable local policies protecting biological resources such as a tree protection policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

6.4.3 Environmental Checklist and Discussion

BIOLOGICAL RESOURCES Would the project…	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☑	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☐	☑
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☑
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☑	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☑
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☑

a) The following provides an analysis of the potential for substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Plants
As discussed in section 6.4.1, no special-status plants or habitat capable of supporting special-status plants occurs within the project site. No impact would occur.

Wildlife
As explained above in section 6.4.1, special-status wildlife with potential to occur within the project site includes western burrowing owl, Swainson's hawk, white-tailed kite, and loggerhead shrike. An analysis of the project's potential to impact these species is included below.

Potential Impacts to Nesting Burrowing Owl
Burrowing owl has been known to occur at the UC Davis campus in grasslands east of the Health Sciences District and near the intersection of Garrod Drive and Veterinary Medicine Drive. Most recently, two pairs of burrowing owls nested within the field east of the Health Sciences District. Prior to the 2001 nesting season, one pair was observed wintering in the east field and relocation was undertaken in compliance with CDFG guidelines as part of the UC Davis Veterinary Medicine Facilities Improvement Project. Additionally the relocated pair used the artificial burrow created as compensation habitat for several months, but have not been observed since (UC Davis 2003f).

Though the project site consists mostly of trees and landscaped lawn, ruderal areas along the northern and western boundaries of the site provide potential nesting habitat for this species. Burrowing owls are not known to occur in Shields Oak Grove, but there is potential for owls dispersing from other nearby areas to move into previously unoccupied habitat within and adjacent to the grove prior to or during the initiation of project activities. As a general practice, the campus is managed to discourage the establishment of ground squirrel burrows thereby reducing the potential for new burrowing owls to move in but there is still potential for this species to occur onsite.

Burrowing owl is a state species of special concern and its nests and eggs are protected under the MBTA and CFGC. Potential impacts to nesting burrowing owls could result from disturbances within 160 feet of occupied burrows, resulting in desertion of the burrow or nest abandonment . This impact would be considered potentially significant. Implementation of Mitigation Measure BIO-1 would ensure that nesting disturbance would not occur and reduce this potential impact to less than significant.

Mitigation Measure 1: Conduct Pre-Activity Survey for Burrowing Owl and Avoid and Compensate for Impacts in Accordance with CDFG Guidelines

In accordance with CDFG's *Staff Report on Burrowing Owl Mitigation* a pre-activity survey must be conducted prior to any noise disturbance activities at the project site (CDFG 1995) and ongoing burrowing owls surveys of campus areas will include the project site in the upcoming survey efforts. To ensure that nesting disturbance will not occur, the survey shall be conducted prior to February 1st and within 1 week of the commencement of active deterrence activities during the timeframe specified in the *Burrowing Owl Survey Protocol and Mitigation Guidelines* (i.e., 1 hour before sunrise to 2 hours after sunrise, or 2 hours before sunset to 1 hour after sunset) (CDFG 1993). The survey should include the project site and adjacent suitable areas within 500 feet up to the nearby Interstate 80 and State Route 113 corridors to ensure that burrowing owls potentially occurring adjacent to the site are not disturbed. If no active burrows are detected, deterrence activities can commence and no further mitigation is required. Unoccupied mammal burrows or other suitable habitat areas identified within and adjacent to the site may

be removed or otherwise altered to discourage burrowing owl occupancy immediately upon completion of the survey.

If active burrowing owl burrows are detected during or immediately preceding the proposed project (March to July), a qualified biologist will evaluate whether the proposed project will potentially disturb the nest at the specific site. If yes, acoustic frightening devices and increased human presence will not occur within 160 feet of the active burrows, but other heron deterrence techniques will continue. Active burrows will not be physically disturbed during the burrowing owl breeding season (February 1–August 31). In anticipation of implementing the proposed project in subsequent years, passive relocation techniques (e.g., installing one-way doors at burrow entrances) will be used instead of trapping, as described in CDFG guidelines. At least 1 week will be necessary to complete passive relocation and allow owls to acclimate to alternate burrows.

If destruction of occupied burrows is unavoidable during the non-breeding season (September 1–January 31), the project proponent will take the following actions in accordance with CDFG guidelines (CDFG1995).

- Unsuitable burrows will be enhanced (e.g., enlarged or cleared of debris) or new burrows created (i.e., installing artificial burrows) at a ratio of 2:1 on protected lands approved by CDFG. Newly created burrows will follow guidelines established by CDFG.

- CDFG requires that the loss of foraging and burrowing habitat on the project site will be offset by acquiring and permanently protecting a minimum of 6.5 acres of foraging habitat per active burrow identified on the project site.

Potential Impacts to Nesting Swainson's Hawk, White-tailed Kite, Loggerhead Shrike, and Other Migratory Birds and Raptors

Swainson's hawk is known to nest in numerous locations within one mile of the project site. Specifically the nearest reported occurrence is for a nest along Putah Creek just southwest of the UC Davis sewage disposal plant approximately 1/4 mile from the project site (CNDDB 2008). This species is also known to nest in the Arboretum (UC Davis 2006). As reported by UC Davis avian expert Sid England, Swainson's hawks have not been recorded in Shields Grove during nesting surveys of the campus beginning in the mid-1990s and general biological monitoring of Shields Grove conducted since 2005. Since the mid-1990s, Swainson's hawks have been recorded nesting at five locations within 1/2 mile of Shields Grove. All are approximately 1/4 mile or greater from Shields Grove and are screened by existing trees and/or buildings. All five of these sites are within 100 feet of Interstate 80 or State Route 113 and therefore located in an area where people and equipment are routinely present for campus operations. Thus, the birds are highly habituated to human presence and noise including nighttime traffic on Interstate 80 or State Route 113 (S. England, pers. comm.).

White-tailed kite has been reported to nest within the campus primarily along Putah Creek including the historic Putah Creek stream channel on the west campus. Other nest sites within the project vicinity include a nest along the south bank of Putah Creek, 0.5 mile south of the UC Davis airport, and a nest in east Davis along Camphor Lane in a tree in the front yard of a rural residence (CNDDB 2008). Birds occupying these nests are also likely highly habituated to human related noise disturbance. Though not reported to nest or forage within the project site, the oak grove provides suitable nesting and foraging habitat for this species.

Loggerhead shrike is known to forage in the agricultural land and ruderal/annual grassland areas on campus (UC Davis 2003f). Though there are no reported nest sites of this species within the project vicinity, the oak grove provides suitable nesting and foraging habitat for this species.

Though not considered to be special-status species, numerous other migratory birds and raptors, are known to occur within the project site during the breeding season, and therefore have potential to nest there. Other raptors and migratory birds with potential to nest onsite include great horned owl (*Bubo virginianus*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), Nuttall's woodpecker (*Picoides nuttallii*), and Oak titmouse (*Baeolophus inornatus*), among others.

Special-status bird species identified as having some potential to occur in the vicinity of the project site, namely Swainson's hawk, white-tailed kite, and loggerhead shrike, have not been previously known to nest in the grove and are therefore not expected to occur on the project site, although they may occur in nearby areas within the Arboretum and adjacent areas of the Putah Creek riparian corridor.

Disturbance resulting in abandonment of active nests of special-status birds, raptors and other migratory birds, would be considered a potentially significant impact. However, for the vast majority of species, deterrence activities are scheduled to begin prior to the breeding season and therefore, these species are unlikely to nest in or adjacent to the project site. Some species, such as great horned owl, western screech owl (*Megascops kennicottii*), and barn owl (*Tyto alba*), have the potential to begin nesting prior to the initiation of deterrence activities and therefore implementation of the proposed project could result in abandonment of nests of these species if they occur on or adjacent to the project site. However, as part of the project, a survey will be conducted for nesting birds prior to the initiation of deterrence activities and a setback buffer of 200 feet around any active nests that are located is required. In addition, monitoring will be conducted throughout the breeding season to ensure that no active nests are disturbed. Therefore, this impact is less then significant.

b) No riparian habitat occurs within the bounds of the proposed project and thus no impact to riparian habitat would occur. The project site contains a cultivated oak grove, containing both native and non-native oak species and hybrids and does not qualify as a sensitive natural community. However, the oak grove is recognized as a collection of national significance by the North American Plant Collections Consortium and though the proposed project would result in tree pruning and possible tree removals, these actions are standard practices carried out in order to manage and maintain the grove and the overall project would result in a beneficial impact to this resource by reducing the damage and degradation associated with the heron rookery. No impact would occur.

c) No federally protected wetlands occur within the project site. No impact would occur.

d) The proposed project would not interfere with the movement of any native resident or migratory species or with established native resident or migratory wildlife corridors.

The proposed project would impede the use of a native wildlife nursery site by preventing the use of the site by nesting herons, which is the purpose of the project, and potentially other bird species. However, there are no unique characteristics of the project site that make it uniquely suitable for nesting by herons. Black-crowned night herons, snowy egrets, and cattle egrets in the western U.S. are highly flexible in their selection of breeding colony sites (Davis 1993, Parsons and Master 2000, Telfair 2006), as are great egrets, but to a lesser extent (Mccrimmon et al. 2001). ICF Jones and Stokes biologist, Doug Leslie, and local avian expert Jim Estep have observed black-crowned night herons and snowy egrets to nest locally in a variety of habitat types and nest substrates including a non-native eucalyptus grove, a relatively young stand of cottonwoods on a small island within a created freshwater marsh, large, mature groves of

cottonwood and sycamore trees, low-growing Himalayan blackberry in a severely down-cut, intermittent stream, and 50-year old Modesto ash trees planted as landscaping around an elementary school. Although some colonies may last for decades, others have been documented to move, particularly in response to disturbance (Davis 1993).

Though little research has been conducted on relocation following displacement, one case study provided anecdotal evidence that rookeries will move to other suitable areas within a region. In Hall (1985), pyrotechnics, propane cannons, and alarm call broadcasting were used to disperse a breeding colony composed of 10,000 great blue and little blue herons, and cattle, snowy, and great egrets in Van Buren, Oklahoma. The following year, a colony was found to be established approximately 13 miles west of the site in a neighboring town and was observed to successfully rear young. Though the birds dispersed from the original site were not banded and could not be confirmed to be the same birds, the colony was observed to use the same foraging areas as the colony at the original site and was therefore believed to be the same colony. Similarly, ICF Jones & Stokes Senior Wildlife Biologist, Doug Leslie, observed a heron colony in East Sacramento utilize Modesto Ash trees surrounding an elementary school as a rookery site and then move short distances and nest successfully the season following the removal of all previously utilized nest trees at the school. The colony was observed to move again in subsequent years as neighbors sought to discourage the use by nesting herons of shade trees in their yards.

There are numerous areas which may provide alternative nesting sites within the project vicinity and region, including large stands of mature riparian trees along the Sacramento River, Putah Creek, Willow Slough, within the Yolo Bypass Wildlife Area, and along Cache Creek. The closest large herony to the Shields Oak Grove site is a rookery of over 1,400 birds in a eucalyptus grove along Yolo County Road 103 south of County Road 29, 8.3 miles northeast of the project area. This rookery is comprised of the same four species as the Shields Grove rookery (A. Engilis, Jr. personal observation). In addition, several heron rookeries have been documented in the project region: (1) a black-crowned night heron rookery located south of Highway 16, 0.1 mile east of the intersection with County Road 89 (CNDDB 2008); (2) the snowy egret and black-crowned night heron rookeries in the Natomas Basin noted above; and (3) a great blue heron rookery in a large stand of cottonwoods just east of the Yolo Bypass Wildlife Area, 2.5 miles south of I-80 on Port of Sacramento property (D. Feliz, pers. comm.). Although possibly too distant from the Shield Oak Grove site, other large nesting colonies are known to exist at Folsom Lake State Park, the Cosumnes River Preserve, Stone Lakes National Wildlife Refuge, the south side of the American River near William Pond Park, an area north of the Sacramento Airport, and the Sacramento Bufferlands (CNDDB 2008).

Other species of non-special-status birds have been documented using the Shields Grove during the breeding season and are presumed to breed there (Castaneda and Truan 2006). Nesting habitat for these species would not be available for the period of time in deterrence activities directed at the herons is taking place. However, these species are expected to return to the grove once the nesting herons have been displaced. In addition, as noted above for herons, the Shields Grove does not provide any unique habitat features that are uncommon within the project vicinity and greater project region.

Given that the habitat features present in Shields Grove are not unique, and that similar habitats are common within the surrounding project vicinity and project region that provide other nesting opportunities for breeding herons and other birds utilizing the Shields Grove, and that disturbance leading to nest failure would be completely avoided, this impact is less than significant.

e) Plans, documents, and policies that apply to the project site include the 2003 UC Davis LRDP and EIR. Activities undertaken as part of the proposed project are consistent with the policies contained within these plans. Additionally the 2006 UC Davis Arboretum Wildlife Management and Enhancement

Plan identifies heron management options which are consistent with the plan proposed for implementation. No impact would occur.

f) No adopted habitat conservation plans or natural community conservation plans apply to the project site. No impact would occur.

Summary

The proposed project would not exceed the levels of significance of biological resources impacts. One new mitigation measure is proposed to reduce the potential impact to burrowing owl. This measure requires that a formal protocol-level survey be conducted for this species and that appropriate mitigation occur if the species is found to occur within the potential impact area. The survey required by this mitigation measure will be performed prior to February 1 and will be performed regardless of whether the project is approved to ensure compliance with the CDFG requirements.

6.5 CULTURAL RESOURCES

6.5.1 Background

Section 4.5 of the 2003 LRDP EIR addresses the cultural resources effects of campus growth under the 2003 LRDP and provides additional information regarding cultural resources and the long-term planning for cultural resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth, and does not implement the LRDP.

Project Site

The project site is a landscaped area within the central campus at UC Davis and is within the zone of sensitivity for cultural resources because of the proximity to the historic Putah Creek stream channel. The project site includes two structures, the Arboretum Gazebo and the Arboretum Restroom building.

6.5.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project for Archaeological and for Historic Resources.

Archaeological Resources

The 2003 LRDP EIR considers an impact on archaeological resources significant if growth under the 2003 LRDP would:

- Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guideline § 15064.5.
- Disturb any human remains, including those interred outside of formal cemeteries.

A "unique archaeological resource" is defined under CEQA through Public Resources Code Section 21083.2(g). A unique archaeological resource implies an archaeological artifact, object, or site about which it can be clearly demonstrated that there is a high probability that it meets one of the following criteria:

- The archaeological artifact, object, or site contains information needed to answer important scientific questions and there is a demonstrable public interest in that information, or
- The archaeological artifact, object, or site has a special and particular quality, such as being the oldest of its type or the best available example of its type, or
- The archaeological artifact, object, or site is directly associated with a scientifically recognized important prehistoric or historic event or person.

For a resource to qualify as a unique archaeological resource, the agency must determine that there is a high probability that the resource meets one of these criteria without merely adding to the current body of knowledge (PRC § 21083.2(g)). An archaeological artifact, object, or site that does not meet the above

criteria is a nonunique archaeological resource (PRC § 21083.2(h)). An impact on a nonunique resource is not a significant environmental impact under CEQA (CEQA Guidelines § 15064.5(c)(4)). If an archaeological resource qualifies as a historical resource under CRHR or other criteria, then the resource is treated as a historical resource for the purposes of CEQA (CEQA Guidelines § 15064.5(c)(2)).

Section 15064.5 of the CEQA Guidelines assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. These procedures are detailed under PRC § 5097.98. California Health and Safety Code § 7050.5(b) prohibits disturbance of human remains uncovered by excavation until the Coroner has made a finding relative to PRC § 5097 procedures.

Historical Resources

For the purposes of this EIR, as mandated by PRC § 21083.2, impacts of the proposed project on an historical resource would be considered significant if it would:

- cause a significant adverse change in the significance of a historical resource as defined in CEQA Guidelines § 15064.5.

6.5.3 Environmental Checklist and Discussion

CULTURAL RESOURCES Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	☐	☐	☐	☑
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☐	☐	☑
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☑
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☑

a-d) The proposed project would include no subsurface excavation and would include no activities that could destroy buried resources. In addition, the project would include no changes to the buildings on the project site. The proposed project would have no effect on archaeological or historical resources. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for cultural resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.6 GEOLOGY, SOILS, & SEISMICITY

6.6.1 Background

Section 4.6 of the 2003 LRDP EIR addresses the Geology, Soils, and Seismicity effects of campus growth under the 2003 LRDP and provides additional information regarding Geology, Soils, and Seismicity resources and the long-term planning for Geology, Soils, and Seismicity resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The project site at Shields Grove is mostly flat area towards the north and a slightly sloped area toward the south.

6.6.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Expose people or structures to potential substantial adverse effects involving strong seismic ground shaking.
- Expose people or structures to potential substantial adverse effects involving seismic-related ground failure.
- Result in substantial soil erosion or the loss of topsoil. (Impacts associated with the effect of erosion on water quality are addressed in Section 7.8 Hydrology & Water Quality.)
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse.
- Be located on expansive soil, creating substantial risks to life or property.
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Additional standards from the CEQA Guidelines' Environmental Checklist (a,i) and (a,iv) in the checklist below) were found not applicable to campus growth under the 2003 LRDP.

6.6.3 Environmental Checklist and Discussion

GEOLOGY, SOILS, & SEISMICITY Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☑
ii) Strong seismic ground shaking?	☐	☐	☐	☑
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☑
iv) Landslides?	☐	☐	☐	☑
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☑
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☑
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☑
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☑

a-e) The proposed project includes no changes to structures and would not increase the number of people on campus. The project proposes no modifications to ground surface conditions, includes no new structures, and does not include modifications to septic tanks or wastewater systems. The temporary project fence will be installed with fence posts hammered into the ground and removal of the fence posts will be accomplished by pulling the posts out of the ground. The fence installation and removal will not include soil excavation. The project would have no effect on seismic safety or landslide potential and no effect on soil erosion. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for geology, soils, and seismicity. A potentially significant impact would not occur and no mitigation measures are proposed.

6.7 HAZARDS & HAZARDOUS MATERIALS

6.7.1 Background

Section 4.7 of the 2003 LRDP EIR addresses the hazards and hazardous materials effects of campus growth under the 2003 LRDP and provides additional information regarding hazards and hazardous materials resources and the long-term planning for hazards and hazardous materials resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The project site is a landscaped area with no signs or known history of hazardous materials use or contamination. The site is typically open for public access but will be temporarily fenced to restrict public access during project-related nesting deterrent activities.

6.7.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school.
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment.
- For a project within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in a safety hazard for people residing or working in the project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Additional standards from the CEQA Guidelines' Environmental Checklist ("f" and "h" in the checklist below) were found not applicable to campus growth under the 2003 LRDP.

6.7.3 Environmental Checklist and Discussion

HAZARDS & HAZARDOUS MATERIALS Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☑	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☑
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☑
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☑
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☑

a) The proposed project would include employee use of pyrotechnics (whistles, exploding rockets, and noise bombs) and green and red laser units to discourage bird nesting in Shields Grove. The employees would be trained by the UC Davis Office of Environmental Health and Safety to use the laser units. The red laser units are a class IIIb unit with output of 50mW and operates on a laser wavelength of 650 nm. The green laser is a class IIIa unit with output of 4.99mW on a laser wavelength of 532mn. The training would include safe handling and operating practices for employee use and transport of pyrotechnics. Additionally, the lasers and pyrotechnics would be used inside the fenced portion of the project area or in areas temporarily closed to public access within the project area. No health risks are expected from the use of the green and red lasers or the pyrotechnics. Any potential impacts to human health would be less-than-significant. No mitigation measures are proposed.

b-h) The proposed project would include no emissions near a school and no activities near a hazardous materials site. The project would have no effects on airports and no effects on emergency response planning. The project is not within an area of potential wildland fires. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for hazards or hazardous materials. A potentially significant impact would not occur and no mitigation measures are proposed.

6.8 HYDROLOGY & WATER QUALITY

6.8.1 Background

Section 4.8 of the 2003 LRDP EIR addresses the hydrology and water quality effects of campus growth under the 2003 LRDP and provides additional information regarding hydrology and water quality resources and the long-term planning for hydrology and water quality resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

Drainage at the Shields Grove site consists of surface drainage from the oak tree area and the lawn area into the Arboretum Waterway. Water from the Arboretum Waterway is pumped to Putah Creek during large storm events.

6.8.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on site or off site.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on site or off site.
- Create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.
- Otherwise substantially degrade water quality.
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding.

6.8.3 Environmental Checklist and Discussion

HYDROLOGY & WATER QUALITY Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☑
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☑
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☑
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☑
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☑
f) Otherwise substantially degrade water quality?	☐	☐	☐	☑
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☑
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☑
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☑
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☑

a-j) The proposed project includes no modifications to surface conditions, storm drainage, or water usage. The proposed project includes wildlife management activities that have no relation to hydrology and water quality factors. The temporary project fence material would allow water to pass under and around the fence material and would not interfere with surface drainage. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for hydrology and water quality resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.9 LAND USE & PLANNING

6.9.1 Background

Section 4.9 of the 2003 LRDP EIR addresses the land use and planning effects of campus growth under the 2003 LRDP and provides additional information regarding land use and planning and the long-term planning for land use and planning resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The project site is designated as *Teaching and Research Open Space* in the 2003 LRDP. The proposed project site is a component of the UC Davis Arboretum and is frequently used for teaching and research purposes in connection with UC Davis.

6.9.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect.
- Result in development of land uses that are substantially incompatible with existing adjacent land uses or with planned uses.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

An additional standard from the CEQA Guidelines' Environmental Checklist ("a" in the checklist below) was found not applicable to campus growth under the 2003 LRDP.

6.9.3 Environmental Checklist and Discussion

LAND USE & PLANNING Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☑
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☑
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☑

d)	Result in development of land uses that are substantially incompatible with existing adjacent land uses or with planned uses?	☐	☐	☐	☑

a-d) The proposed project would not divide an established community and would not conflict with applicable land use planning efforts. The project site is not within or adjacent to a habitat conservation plan or natural community conservation plan. The project would result in no development activities and, accordingly, would not result in development that is incompatible with existing adjacent land uses. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for land use and planning. A potentially significant impact would not occur and no mitigation measures are proposed.

6.10 MINERAL RESOURCES

6.10.1 Background

Sand and gravel are important mineral resources in the region (CDOC 2000). However, natural gas is the only known or potential mineral resource that has been identified on campus. Natural gas can be extracted at wells placed considerable distances from deposits. No other known or potential mineral resources have been identified on the UC Davis campus. Therefore, development on campus does not impede extraction or result in the loss of availability of mineral resources.

Section 4.6, Geology, Soils, and Seismicity, of the 2003 LRDP EIR briefly addresses mineral resources issues. The 2003 LRDP EIR concludes that development on campus would not impede extraction or result in the loss of availability of mineral resources. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

6.10.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

6.10.3 Environmental Checklist and Discussion

MINERAL RESOURCES Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☑
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☑

a, b) Natural gas is the only known or potential mineral resource that has been identified on campus. The project does not involve any activities that would impede the ability of the campus to extract natural gas. Natural gas can be extracted at wells placed considerable distances from deposits, so even if extraction were excluded within the proposed fenced area, such exclusion would not result in a significant impact. No impact would occur and no further analysis is required.

Summary

The proposed project would not exceed the standards of significance for mineral resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.11 NOISE

6.11.1 Background

Section 4.10 of the 2003 LRDP EIR addresses the noise effects of campus growth under the 2003 LRDP and provides additional information regarding noise resources and the long-term planning for noise resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does no implement the LRDP.

Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB), and the decibel scale adjusted for A-weighting (dBA) is a special frequency-dependent rating scale that relates to the frequency sensitivity of the human ear. Community noise usually consists of a base of steady "ambient" noise that is the sum of many distant and indistinguishable noise sources, as well as more distinct sounds from individual local sources. A number of noise descriptors are used to analyze the effects of community noise on people, including the following:

- L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise, measured during a prescribed period, typically one hour.
- L_{dn}, the Day-Night Average Sound Level, is a 24-hour-average L_{eq} with a 10 dBA "penalty" added to noise occurring during the hours of 10:00 PM to 7:00 AM to account for greater nocturnal noise sensitivity.
- CNEL, the Community Noise Equivalent Level, is a 24-hour-average L_{eq} with a "penalty" of 5 dB added to evening noise occurring between 7:00 PM and 10:00 PM, and a "penalty" of 10 dB added to nighttime noise occurring between 10:00 PM and 7:00 AM.

Project Site

The primary noise source in the vicinity of the project site is vehicular traffic using I-80 and SR 113. The noise from the nearby traffic is noticeable at the project site but generally does not detract from the site as a location for recreational, teaching, and research activities. Land use surrounding the site is primarily teaching and research open space to the south and east, recreational to the west, and teaching and research to the north. The area north of Shields Grove consists of a landscaped area between Shields Grove and the Garrod Drive. North of Garrod Drive are animal pastures used in association with the veterinary medicine teaching hospital and research buildings located north of the pastures. The area west of the project site is used by the UC Davis Equestrian Center for equestrian classes and training.

6.11.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Exposure of persons to or generation of noise levels in excess of levels set forth in Table 4.10-3 of the 2003 LRDP EIR (table provided below).

Thresholds of Significance for Noise Evaluations

Noise Source[a]	Criterion Noise Level[b]	Substantial Increase in Noise Level[b]
Road Traffic and Other Long-Term Sources	65 dBA CNEL	>=3 dBA if CNEL w/project is >= 65 dBA >=5 dBA if CNEL w/project is 50–64 dBA >=10 dBA if CNEL w/project is < 50 dBA
Stadium (Periodic, intermittent)	70 dBA $L_{eq(h)}$ [c] Daytime (7:00 a-7:00 p) 70 dBA $L_{eq(h)}$ Evening (7:00 p-11:00 p) 65 dBA $L_{eq(h)}$ Nighttime (11:00 p-7:00 a)	Not Applicable
Railroad	Within 750 feet of railroad line[d]	
Aircraft	65 dBA CNEL	>=1.5 dBA if CNEL w/project is >= 65 dBA >=3 dBA if CNEL w/project is 60–64 dBA >=5 dBA if CNEL w/project is < 60 dBA
Construction (temporary)	80 dBA $L_{eq\ (8h)}$[e] daytime (7:00 a-7:00 p) 80 dBA $L_{eq\ (8h)}$ evening (7:00 p-11:00 p) 70 dBA $L_{eq\ (8h)}$ nighttime (11:00 p-7:00 a)	Not Applicable

Source: 2003 LRDP EIR

[a] The 2003 LRDP would not substantially increase rail activity; therefore, a threshold of significance for rail noise is not included in this table.

[b] At noise-sensitive land use unless otherwise noted. Noise-sensitive land uses include residential and institutional land uses.

[c] $L_{eq(h)}$ is an average measurement over a one-hour period.

[d] Screening analysis distance criterion from FTA 1995.

[e] $L_{eq(8h)}$ is an average measurement over an eight-hour period.

- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- For a project within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels.

6.11.3 Environmental Checklist and Discussion

NOISE Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☑
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☑

c)	A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☑
d)	A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☑	☐	☐
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑
f)	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑

a-c) The proposed project would generate temporary noise levels (as discussed below under item "d") that would be sporadic during a very limited portion of the day. Accordingly, these increased levels would not contribute to a permanent increase in noise levels and increased noise levels would not exceed the campus standards of significance. The pyrotechnics will have no effects on ground-borne vibration. No impact would occur.

d) The proposed project would include noise-making activities (pyrotechnic whistles and explosions) to scare the herons away from Shields Oak Grove. The pyrotechnics would be used only within Shields Grove and will primarily take place in the time span of two hours before and after sunset and sunrise as the birds arrive to prospect for suitable nest sites. The activities would extend from March through July of each year beginning in 2009. The pyrotechnics would be used in conjunction with distress calls and lasers to dissuade the birds from establishing nests in the Shields Grove.

The pyrotechnics will be used sparingly to retain effectiveness and avoid habituating the birds to the loud noises. The expected frequency of the pyrotechnics is for a collection of two to three pyrotechnics to be used one or two times per hour during the limited times when these techniques are used. The explosions are estimated to produce a noise level of 130 db at a distance of three feet, and the whistles are estimated to produce a noise level of 85 db at three feet. The nearest sensitive receptors are adjacent areas in the Arboretum, horse pastures to the north of the site, and horse pastures west of the site that range from 100 to 400 feet from the project site. These areas are expected to experience instantaneous noise levels of 88 to 100 db one or two times per hour during the limited time these techniques are used.

The infrequent use of the pyrotechnics would produce a one hour average noise level below the applicable standards of significance of 70 to 80 db for temporary noise sources. However, the sudden noise event caused by the explosion may disrupt the classes and training at the equestrian center west of the project site. The potential disruptions at the equestrian center could range from distractions to the horses so that class effectiveness is reduced to more serious effects of horses being spooked by the explosions with potentially hazardous consequences to the riders. The potential effects on the horses are uncertain and may not be disruptive. However, the potential noise effect is considered a potentially significant impact and the following mitigation measure would reduce the potential impact to a less-than-significant level.

Mitigation Measure-2: Test noise making activities to evaluate and minimize potential effects on the UC Davis Equestrian Center.

Prior to starting the management program, the University will conduct a test of the pyrotechnics to observe the potential effects on horses within the equestrian center. The test will be scheduled to include a variety of noise levels based on the proximity of different explosions. If the tests reveal no effect on the horses, the heron control program and equestrian center activities will continue as planned. If the tests reveal significant conflicts between the Equestrian Center classes and the pyrotechnics, the following actions will be taken:

a) The Arboretum would work with the Equestrian Center to coordinate the project schedule with the timing and location of Equestrian Center classes; and/or,
b) the use of the pyrotechnics will be eliminated or minimized within the distances that could reduce class effectiveness or create safety hazards by spooking horses.

With incorporation of Mitigation Measure 3, the potential impact on Equestrian Center classes would be reduced to a less-than-significant level.

e,f) The proposed project is within two miles of the UC Davis airport, a public use airport. The proposed project would not expose people to excessive noise levels as described above under items "a-c" and item "d." No impact would occur.

Summary

The proposed project would exceed the standards of significance for noise resources and a mitigation measure (MM-3) would reduce the potential impact to a less-than-significant level.

6.12 POPULATION & HOUSING

6.12.1 Background

Section 4.11 of the 2003 LRDP EIR addresses the population and housing effects of campus growth under the 2003 LRDP and provides additional information regarding population and housing resources and the long-term planning for population and housing resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The project site is currently vacant. No housing is located or planned on or adjacent to the project site.

6.12.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Directly induce substantial population growth in the area by proposing new housing and employment.
- Create a demand for housing that could not be accommodated by local jurisdictions.
- Induce substantial population growth in an area indirectly (for example, through extension of roads or other infrastructure).

Additional standards from the CEQA Guidelines' Environmental Checklist ("b" and "c" in the checklist below) was found not applicable to campus growth under the 2003 LRDP.

6.12.3 Environmental Checklist and Discussion

POPULATION & HOUSING Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☑
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
d) Create a demand for housing that cannot be accommodated by local jurisdictions?	☐	☐	☐	☑

a-c) The proposed project involves no components that would result in increased employment levels, no increases to student enrollment, and no increases housing levels. No new campus staff or personnel are required to carry out the project. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for population and housing. A potentially significant impact would not occur and no mitigation measures are proposed.

6.13 PUBLIC SERVICES

6.13.1 Background

Section 4.12 of the 2003 LRDP EIR addresses the public services effects of campus growth under the 2003 LRDP and provides additional information regarding public services resources and the long-term planning for public services resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The project site is currently vacant and there are no existing or planned public service facilities (fire, police, schools or libraries) on or adjacent to the site.

6.13.2 Standards of Significance

The 2003 LRDP EIR considered the following standard of significance as appropriate for projects at UC Davis. This standard is based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and is considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services.

Effects associated with recreation services are evaluated in Section 7.14, Recreation, and effects associated with the capacity of the domestic fire water system to provide adequate fire protection are evaluated in Section 7.16, Utilities.

6.13.3 Environmental Checklist and Discussion

PUBLIC SERVICES Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i) Fire protection?	☐	☐	☐	☑
ii) Police protection?	☐	☐	☐	☑
iii) Schools?	☐	☐	☐	☑

iv) Parks?	☐	☐	☐	☑
v) Other public facilities?	☐	☐	☐	☑

a,b,c) The proposed project would include no changes to public services and no increases to demand for public services. The site would continue to be served by UC Davis fire and police services. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for public services. A potentially significant impact would not occur and no mitigation measures are proposed.

6.14 RECREATION

6.14.1 Background

Section 4.13 of the 2003 LRDP EIR addresses the recreational effects of campus growth under the 2003 LRDP and provides additional information regarding recreational resources and the long-term planning for recreational resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The project site currently includes informal recreational uses in addition to the teaching and research uses of the landscaped areas within the UC Davis Arboretum. The recreational uses at the site include passive recreation activities such as walking, bird watching, jogging, and picnicking.

6.14.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Increase the use of existing neighborhood and regional parks or other recreation facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Propose the construction of recreation facilities or require the expansion of recreation facilities, which might have an adverse physical effect on the environment.

6.14.3 Environmental Checklist and Discussion

RECREATION Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☑

a,b) The proposed project would not increase the use of neighborhood or regional parks. The project would involve a temporary minor reduction in the amount of recreational area at the UC Davis Arboretum but would not involve closure of a large portion of the arboretum and would not involve closure of major walkways or paths in the arboretum. The small closure of approximately 4 acres is not expected to shift recreational use to other park facilities. The project does not involve construction of recreational facilities. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for recreational resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.15 TRANSPORTATION, CIRCULATION, & PARKING

6.15.1 Background

Section 4.14 of the 2003 LRDP EIR addresses the transportation, circulation, and parking effects of campus growth under the 2003 LRDP and provides additional information regarding transportation, circulation, and parking resources and the long-term planning for transportation, circulation, and parking resources at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The project site is accessed by Garrod Drive, a general use roadway within UC Davis.

6.15.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Cause an increase in the traffic that may be substantial in relation to the existing roadway capacity of the street system as indicated by LOS standards for congestion at intersections.

  The addition of project traffic causing a LOS change from acceptable to unacceptable would have a significant impact. The following LOS thresholds apply to the study intersections.

  - LOS D is the minimum acceptable LOS for UC Davis.
  - LOS E is the minimum acceptable LOS for the City of Davis. LOS F is acceptable for the City of Davis Core Area.
  - LOS E is the minimum acceptable LOS for I-80 and its associated interchanges.
  - LOS C is the minimum acceptable LOS for SR 113 and its associated interchanges.

  In addition, the project would have a significant impact if the project adds 10 or more vehicles to the volume of a study intersection that is expected to operate unacceptably without the project. For intersections that operate unacceptably without the project, even a small amount of additional traffic could increase the delay. For this EIR, future volumes are rounded to the nearest 10; therefore, 10 vehicles is the minimum amount of traffic that could be added to an intersection already operating at an unacceptable level.

  Increased intersection congestion would also be a significant impact if it would exceed a LOS standard established by the county congestion management agency (or any affected agency or jurisdiction) for designated roads or highways.

- LOS E is the minimum acceptable LOS for roadways and intersections in Solano County.
- LOS E is the minimum acceptable LOS for I-80 and its associated interchanges between the Solano County limit and Olive Drive.
- LOS E is the minimum acceptable LOS for SR 113 and its associated interchanges within the Davis city limits.
- LOS E is the minimum acceptable LOS for Russell Boulevard between SR 113 and B Street.
- LOS E is the minimum acceptable LOS for Richards Boulevard between First Street and I-80.
- LOS E is the minimum acceptable LOS for First Street between B Street and Richards Boulevard.
- LOS E is the minimum acceptable LOS for B Street between First Street and 5th Street.

- Result in inadequate parking capacity.

  For parking, a project would be considered to have a significant impact if it is expected to increase the winter utilization rate to over 90 percent on the central campus, Health Sciences District, and/or major facilities of the west and south campus without adequate time (usually 24 months) to implement a parking solution to campus construction standards.

- Conflict with applicable adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Impacts related to safety risks associated with the UC Davis airport and emergency access are discussed in Section 7.7 Hazards and Hazardous Materials. The 2003 LRDP would make only limited changes to the roadway network and would not create or increase hazards due to design features such as dangerous intersections.

6.15.3 Environmental Checklist and Discussion

TRANSPORTATION, CIRCULATION, & PARKING Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	☐	☐	☐	☑
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☑
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☑

d)	Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☑
e)	Result in inadequate emergency access?	☐	☐	☐	☑
f)	Result in inadequate parking capacity?	☐	☐	☐	☑
g)	Conflict with applicable adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	☑

a-g) The proposed project is a wildlife management activity that would have no effect on transportation or circulation resources. The project involves no changes to roadways and no changes to traffic levels. Personnel working on the heron deterrence activities will arrive by walking, bicycle, or personal motor vehicle. These trips will not occur during peak periods and will consist of approximately one or two trips per hour and would not be noticeable on the area roadways. The pyrotechnics are not expected to be visible from roadways. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for transportation and circulation resources. A potentially significant impact would not occur and no mitigation measures are proposed.

6.16 UTILITIES & SERVICE SYSTEMS

6.16.1 Background

Section 4.15 of the 2003 LRDP EIR addresses the utility systems effects of campus growth under the 2003 LRDP and provides additional information regarding utility systems and the long-term planning for utility systems at UC Davis. The proposed project is not a component of the overall campus growth planned under the 2003 LRDP because it is a management activity in response to an emerging wildlife condition within the Shields Grove. Accordingly, the proposed project is not related to campus growth and does not implement the LRDP.

Project Site

The proposed project would involve no use of campus utilities and service systems.

6.16.2 Standards of Significance

The 2003 LRDP EIR considered the following standards of significance as appropriate for projects at UC Davis. These standards are based on the standards provided in the CEQA Guidelines' Environmental Checklist (Appendix G of the CEQA Guidelines) and are considered appropriate for the proposed project. Accordingly, an impact from the proposed project would be considered significant if the project would:

- Exceed the Central Valley Regional Water Quality Control Board's wastewater treatment requirements.
- Require or result in the construction or expansion of water or wastewater treatment facilities, which would cause significant environmental effects.
- Require or result in the construction or expansion of storm water drainage facilities, which could cause significant environmental effects.
- Result in the need for new or expanded water supply entitlements.
- Exceed available wastewater treatment capacity.
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs.
- Fail to comply with applicable federal, state, and local statutes and regulations related to solid waste.
- Require or result in the construction or expansion of electrical, natural gas, chilled water, or steam facilities, which would cause significant environmental impacts.
- Require or result in the construction or expansion of telecommunication facilities, which would cause significant environmental impacts.

6.16.3 Environmental Checklist and Discussion

UTILITIES & SERVICE SYSTEMS Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☑
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☑
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the providers existing commitments?	☐	☐	☐	☑
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☑
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☑
h) Require or result in the construction or expansion of electrical, natural gas, chilled water, or steam facilities, which would cause significant environmental impacts?	☐	☐	☐	☑
i) Require or result in the construction or expansion of telecommunication facilities, which would cause significant environmental impacts?	☐	☐	☐	☑

a-i) The proposed project is a management activity within the Shields Grove portion of the UC Davis Arboretum The project would include no modifications to utility and no use of campus utilities. No impact would occur.

Summary

The proposed project would not exceed the standards of significance for utility and service systems. A potentially significant impact would not occur and no mitigation measures are proposed.

6.17 MANDATORY FINDINGS OF SIGNIFICANCE

MANDATORY FINDINGS OF SIGNIFICANCE Would the project…	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☑	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☑
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☑

a) The proposed project would not significantly degrade the quality of the environment. As documented in this Initial Study, the project would not substantially reduce the habitat of a fish or wildlife species and is not expected to cause fish or wildlife populations to drop below self-sustaining levels. The project would have no effect on examples of the major periods of California's history or prehistory. The project would have a potentially significant effect on burrowing owls. This potentially significant impact would be mitigated to a less-than-significant level through the incorporation of Mitigation Measure 1. The project would not reduce the number or restrict the range of Swainson's Hawk, Valley Elderberry Longhorn Beetle, or other special-status species. In addition, the project would have a less-than-significant impact on heron rookery sites with the proposed reduction or elimination of nesting in the Shields Grove area. This impact was determined to be less-than-significant as described in Section 6.4.3(d).

b,c) For most environmental resource topics, the proposed project would have no impacts. However, as analyzed in this initial study, less-than-significant impacts related to the proposed project were identified for aesthetics, biology, and hazardous materials. For aesthetics and hazardous materials, the less-than-significant impacts are site-specific to the proposed project and would occur in association with the active operations of the project without on-going or residual effects. In addition, a potentially significant noise impact was identified in association with the proposed project. However, this potential impact would be a temporary impact and, through the incorporation of Mitigation Measure 2, would be reduced to a less-than-significant level. The temporary noise impact on an adjacent equestrian area is not related to other potential noise effects and would have no potential to be a cumulatively considerable noise effect because the effect would be eliminated if adverse effects are present.

For burrowing owls, the identified potential effects would be less-than-significant with the incorporation of the identified mitigation measure (MM-1). The potential effect would not be a cumulatively considerable effect because the owls would be left undisturbed if they are present within

the project area. For elimination of the heron rookery, the less-than-significant impact is not expected to be cumulatively considerable because the region includes other heronries and potential nesting sites, and herons are known to select rookery sites of varying sizes and with a wide range of habitat qualities.

7 FISH & GAME DETERMINATION

Based on the information presented in this Initial Study, the project has a potential to adversely affect wildlife or the habitat upon which wildlife depend. Therefore, a filing fee will be paid.

____ Certificate of Fee Exemption

__X__ Pay Fee

8 REFERENCES

California Department of Conservation (CDOC), Division of Mines and Geology (currently California Geological Survey). 1996. Probabilistic Seismic Hazard Assessment for the State of California. Open-File Report 96-08. http://www.consrv.ca.gov/CGS/rghm/ psha/ofr9608/index.htm.

California Department of Conservation (CDOC). 2000. Map of Principal Mineral Producing Localities.

California Department of Fish and Game (CDFG). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. Prepared by the Burrowing Owl Consortium, April 1993.

California Department of Fish and Game (CDFG). 1995. Staff Report on Burrowing Owl Mitigation. September 25, 1995. Sacramento, CA: California Department of Fish and Game.

California Natural Diversity Database (CNDDB). 2008. RareFind, Version 3.1.0 (November 2008 update). Sacramento, CA: California Department of Fish and Game. Sacramento, CA

California Native Plant Society (CNPS). 2008. Inventory of Rare and Endangered Plants (online edition, v7-08d). Available: <www.cnps.org/inventory>. Last revised: October 5, 2008. Accessed: December 30, 2008.

Castaneda, AE and MA Truan. 2006. UC Davis Arboretum Wildlife Management and Enhancement Plan. Museum of Wildlife and Fish Biology. UC Davis.

Chandler, Mike, UC Davis Fire Chief. 2003, February 27. Personal communication with Sarah Mattern; regarding achievement of stated standard of response.

Chang, Cecilia, UC Davis Police Department. 2001. Personal communication with Sarah Mattern, UC Davis Office of Resource Management and Planning.

Collins. 2006. NAPCC Multi-Institutional Quercus Collection Application. American Public Gardens Association. Wilmington, Delaware.

Crouch, S., C. Paquette, and David Vilas. Relocation of a Large Black-crowned Night Heron Colony in Southern California. Waterbirds 25(4):474-478.

Custer, T. W., and R. G. Osborn. 1978. Feeding habitat use by colonially-breeding herons, egrets, and ibises in North Carolina. Auk 95:733-743.

Davis, Jr., William E. 1993. Black-crowned Night-Heron (Nycticorax nycticorax), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/074doi:10.2173/bna.74

D'Onofrio, Don and Jim Frame. 2003. Yolo County Subsidence Network Recommendations and Continued Monitoring. Submitted by Don D'Onofrio, Geodetic Consultant and Jim Frame, Frame Surveying and Mapping. February.

Ludorff and Scalmanini Consulting Engineers. 2003. Hydrogeologic Conceptualization of the Deep Aquifer, Davis Area, California. Prepared for UC Davis.

Hall, Douglas I. 1985. Dispersal of a Heron-egret Rookery. Proceedings of the Second Eastern Wildlife Damage Control Conference. Lincoln, Nebraska.

ICF Jones & Stokes. 2007. Biological Effectiveness Monitoring for the Natomas Basin Habitat Conservation Plan Area 2007 Annual Survey Results. April. (J&S 00164.07) Sacramento, CA. Prepared for the Natomas Basin Conservancy, Sacramento, CA.

Mccrimmon, Jr., Donald A., John C. Ogden and G. Thomas Bancroft. 2001. Great Egret (Ardea alba), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/570doi:10.2173/bna.570

Parsons, Katharine C. and Terry L. Master. 2000. Snowy Egret (Egretta thula), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/489 doi:10.2173/bna.489

Telfair RC II. 2006. Cattle Egret (Bubulcus ibis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/113

UC Davis. 1997, October. UC Davis Water Management Plan.

UC Davis Agricultural Services. 2003. UC Davis Irrigation Database (from Irrigation Services Billing) for crops and aquaculture.

UC Davis Office of Resource Management and Planning (ORMP). 2003a. UC Davis Student Population Headcount – 2002-03 Three Quarter Average. Available online at www.ormp.ucdavis.edu/inform/ on October 15, 2003.

UC Davis ORMP. 2003b. Fall 2003 Employee Population Data Based on LRDP Methodology. December 9.

UC Davis ORMP. 2003c. Campus Water Balance.

UC Davis ORMP. 2003e. UC Davis Long Range Development Plan 2003-2015. October.

UC Davis ORMP. 2003f. UC Davis Long Range Development Plan Final Environmental Impact Report. October.

UC Davis. 2008. UCD Arboretum Heron Management Project. UC Davis Arboretum.

U.S. Fish and Wildlife Service (USFWS). 2008. List of Endangered and Threatened Species that may Occur in or be Affected by Projects in the Davis and Merritt USGS Topographic Quadrangles and in Yolo County. Last revised: September 11, 2008. Available: <http://sacramento.fws.gov/es/spp_list.htm>. Accessed: January 2, 2009.

Yolo Audubon Society Checklist Committee. 2004. Checklist of the Birds of Yolo County, California. Yolo Audubon Society. Revised April 2004. Yolo Audubon Society, Davis, CA.

PERSONAL COMMUNICATION

Boyce, Walter. UC Davis Veterinary Medicine Wildlife Health Center. Phone call March 3, 2009.

England, Sid. Avian Ecologist and Director of the UC Davis Office of Resource Management and Planning, University of California at Davis. December 26, 2008—Email.

Engilis, Andy. UC Davis Department of Wildlife, Fish, and Conservation Biology. Email February 24, 2009.

Estep, Jim. Wildlife Biologist, Estep Environmental Consulting. December 31, 2008—Email.

Feliz, David. Wildlife Area Manager, California Department of Fish and Game. January 5, ~~2008~~ 2009—Email.

9 AGENCIES & PERSONS CONSULTED

None

10 REPORT PREPARERS

Matt Dulcich, UC Davis Office of Resource Management and Planning
Andy Engilis, UC Davis Museum of Wildlife and Fish Biology
Sid England, UC Davis Office of Resource Management and Planning
Emily Griswold, UC Davis Arboretum
Erin Hitchcock ICF Jones and Stokes
Doug Leslie, ICF Jones and Stokes

APPENDIX A
~~PROPOSED~~ MITIGATED NEGATIVE DECLARATION

~~PROPOSED~~ MITIGATED NEGATIVE DECLARATION

Lead Agency: University of California

Project Proponent: University of California, Davis

Project Location: UC Davis Central Campus, south of Garrod Drive

Project Description: Beginning in the 2009 nesting season, UC Davis proposes to employ a high level of management actions at the Shields Grove to reduce or prevent heron nesting. The actions will include nest removal and site preparation and the use of frightening devices to discourage nesting. The nest removal and site preparation will include removal of existing nests, removal of guano, and installation of a temporary fence to prevent visitors from accessing the Shields Grove during the use of frightening devices. The frightening devices will include pyrotechnics (loud explosions and loud whistles launched through the air with a glowing visual appearance), bio-acoustics (loud playback of bird distress calls), and handheld lasers (pointed at the birds). The use of frightening devices potentially will take place daily from March through July. Activities will primarily take place for two hours before and after sunrise and sunset as the birds arrive to prospect for suitable nest sites.

Mitigation Measures:

Mitigation Measure -1:

In accordance with CDFG's Staff Report on Burrowing Owl Mitigation a pre-activity survey must be conducted prior to any noise disturbance activities at the project site (CDFG 1995) and ongoing burrowing owls surveys of campus areas will include the project site in the upcoming survey efforts. To ensure that nesting disturbance will not occur, the survey shall be conducted prior to February 1st and within 1 week of the commencement of active deterrence activities during the timeframe specified in the Burrowing Owl Survey Protocol and Mitigation Guidelines (i.e., 1 hour before sunrise to 2 hours after sunrise, or 2 hours before sunset to 1 hour after sunset) (CDFG 1993). The survey should include the project site and adjacent suitable areas within 500 feet up to the nearby Interstate 80 and State Route 113 corridors to ensure that burrowing owls potentially occurring adjacent to the site are not disturbed. If no active burrows are detected, deterrence activities can commence and no further mitigation is required. Unoccupied mammal burrows or other suitable habitat areas identified within and adjacent to the site may be removed or otherwise altered to discourage burrowing owl occupancy immediately upon completion of the survey.

If active burrowing owl burrows are detected during or immediately preceding the proposed project (March to July), a qualified biologist will evaluate whether the proposed project will potentially disturb the nest at the specific site. If yes, acoustic frightening devices and increased human presence will not occur within 160 feet of the active burrows, but

other heron deterrence techniques will continue. Active burrows will not be physically disturbed during the burrowing owl breeding season (February 1–August 31). In anticipation of implementing the proposed project in subsequent years, passive relocation techniques (e.g., installing one-way doors at burrow entrances) will be used instead of trapping, as described in CDFG guidelines. At least 1 week will be necessary to complete passive relocation and allow owls to acclimate to alternate burrows.

If destruction of occupied burrows is unavoidable during the non-breeding season (September 1–January 31), the project proponent will take the following actions in accordance with CDFG guidelines (CDFG1995).

- Unsuitable burrows will be enhanced (e.g., enlarged or cleared of debris) or new burrows created (i.e., installing artificial burrows) at a ratio of 2:1 on protected lands approved by CDFG. Newly created burrows will follow guidelines established by CDFG.

- CDFG requires that the loss of foraging and burrowing habitat on the project site will be offset by acquiring and permanently protecting a minimum of 6.5 acres of foraging habitat per active burrow identified on the project site.

Mitigation Measure-2: Test noise making activities to evaluate and minimize potential effects on the UC Davis Equestrian Center.

Prior to starting heron dissuading activities, the University will conduct a test of the pyrotechnics to observe the potential effects on horses within the equestrian center. The test will be scheduled to include a variety of noise levels based on the proximity of different explosions. If the tests reveal no effect on the horses, the heron control program and equestrian center activities will continue as planned. If the tests reveal significant conflicts between the Equestrian Center classes and the pyrotechnics, the following actions will be taken:

a) The Arboretum would work with the Equestrian Center to coordinate the project schedule with the timing and location of Equestrian Center classes; and/or,
b) the use of the pyrotechnics will be eliminated or minimized within the distances that could reduce class effectiveness or create safety hazards by spooking horses.

With incorporation of Mitigation Measure 3, the potential impact on Equestrian Center classes would be reduced to a less-than-significant level.

Reference:

This ~~Proposed~~ Mitigated Negative Declaration incorporates by reference in their entirety the text of the Initial Study prepared for the project.

Determination:

In accordance with CEQA, a Draft Initial Study has been prepared by UC Davis that evaluates the environmental effects of the proposed project. On the basis of the project's Draft Initial Study the campus found that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made that will avoid or reduce any potential significant effects to a less than significant level. A Mitigated Negative Declaration will be prepared.

Public Review:

In accordance with Section 15073 of the CEQA Guidelines, the Draft Initial Study for the project ~~will be~~ was circulated for public and agency review from January 16, 2009 to February 17, 2009. Comments received during the review period and responses to these comments ~~will be~~ are presented in Appendix C of the Initial Study.

APPENDIX B

THE EFFECT OF A HERONRY ON TREE HEALTH IN SHIELDS OAK GROVE

THE EFFECT OF A HERONRY ON TREE HEALTH IN SHIELDS OAK GROVE

Prepared by Emily Griswold, UC Davis Arboretum
December 1, 2008

10.1.1 Introduction

Heron rookeries are known to threaten the health of the trees in which they nest. There are several documented examples of herons harming or destroying their nest site vegetation through mechanical damage and the effects of guano accumulation on the foliage and soil. It is so common for heron colonies to destroy nest site vegetation and then move on that heron conservation plans often call for preserving multiple possible nesting locations in a region to allow for this behavior. Where their forest habitat is extensive, egret and heron damage to nest site vegetation does not pose much of a problem. The former breeding site undergoes ecological succession, which adds to the structural diversity of the vegetation in the region. However, where forest habitat has been lost or fragmented, herons may increasingly nest in cultivated trees in urban areas.

Concerns about the effect of the heron colony on the trees in Shields Oak Grove were first raised in 2003 by consulting arborist John Lichter when he was working on a comprehensive tree evaluation and horticultural site assessment for the collection. Since then, the arboretum staff has worked with Lichter and other campus partners to study and document the effect of the birds on soil chemistry and various indicators of tree health. Damage has become increasingly evident over the last five years as the colony has grown. However, it is very challenging to predict when tree mortality may occur.

Based on the high density of birds present in the colony, the large amount of guano deposition, measured changes in soil chemistry, observed defoliation and branch death, and the history of other large colonies throughout the world, it is likely that the Shields Grove oaks will decline in health and eventually die if the heronry is allowed to persist at current levels. While the rate of decline will depend upon factors such as local nest density, distribution, and tree health mitigation measures, significant negative effects are expected within a few years.

10.1.2 Literature Review

Negative impacts to vegetation by large aggregations of colonial birds are documented in Weseloh and Brown 1971, Wiese 1978, Gilmore et al. 1984, Dusi and Dusi 1987, Belzer and Lombardi 1989, Baxter and Fairweather 1994, Mun 1997, Ligeza and Smal 2003, Telfair and Bister 2004, and Hobara et al. 2005. Damage mechanisms include: physical damage to trees arising from bird activity, changes in soil chemistry, and leaf loss due to accumulation of guano. Tree death has been known to occur within one to five years. Increasing densities of nesting birds accelerate the negative effects they may have on their nest site vegetation. The expansion of the Cattle Egret range into North America and its rapid proliferation in heron colonies, including the one in Shields Oak Grove, may be hastening damage to

nesting trees and shortening the life-spans of heronries in this region, resulting in more frequent colony site shifts (Telfair 1983).

Mechanisms of Impact

Soil Effects

Measurable changes in soil chemistry as a result of guano deposition beneath large colonies have been correlated with significant vegetation declines over short time periods (often one nesting or roosting season) (Weseloh and Brown 1971, Wiese 1978, Gilmore et al. 1984, Baxter and Fairweather 1994, Mun 1997, Ligeza and Smal 2003, Hobara et al. 2005). In these studies, soil nitrogen, phosphorus, and potassium were significantly higher beneath colonies (Wiese 1978, Mun 1997, Ligeza and Smal 2003). Mun (1997) found elevated calcium levels and Ligeza and Smal (2003) found higher concentrations of ammonium in nesting areas. pH was high in some studies (Wiese 1978) and low in others (Mun 1997). While changes in soil chemistry beneath large colonies was often dramatic, direct cause and effect relationships between heavy bird use and tree death has not been established in controlled experiments.

Mechanical Damage

Egret and heron nests are composed primarily of woody sticks and twigs. When dead sticks are plentiful in the nest-site understory, they will be gathered by birds first for nest construction. If fallen dead sticks are limited, cattle egrets are known to harvest dead twigs from trees and shrubs, and as that supply becomes exhausted, will eventually resort to pulling live, leafy twigs from trees for nest construction Jenni 1969, Arendt & Arendt 1988, Telfair 2006). This behavior is less common among the other native ardeid species (Telfair 2006). Before the breeding seasons in 2006 and 2007, remnants of the previous years' nests and loose sticks in the understory were removed from Shields Oak Grove in an attempt to discourage nesting. In the breeding seasons following these activities, egrets were observed pruning twigs from the trees for nesting materials (Hattori and Bohn, personal communication). Nest site vegetation for ardeids can range from trees to shrubs to reeds. In some cases the weight of nesting can cause branch breakage (Jenni 1969, Arendt & Arendt 1988). This is not as much of a concern in Shields Oak Grove, due to the sturdy nature of oak limbs.

Defoliation

Guano from breeding colonies of egrets and herons affects not only soil chemistry, but also the foliage underneath nests. Foliage under nesting areas becomes coated with guano, impairing the leaves' ability to photosynthesize and exchange gases with the atmosphere. Thoroughly coated leaves no longer benefit the plant through photosynthetic activity and may be shed. Guano also contains ammonia, which is known to cause leaf abscission, or leaf dropping. It is unknown whether the influence of guano coating or ammonia gas has a greater influence on leaf loss. Defoliation appeared to be a major factor in the decline of nest site vegetation on Pea Patch Island, Delaware (see case study below). Defoliation is also one of the most visible effects of the heron colony on the trees in Shields Oak Grove. Repeated defoliation of individual branches under nests has been found to result in branch death.

While most trees can withstand periodic defoliation, severe decline or death may occur following more than two seasons of complete defoliation (Johnson, W.T. and H.Lyon, 1988). The

tolerance of trees to defoliation is related to the amount of foliage lost, the time of year of defoliation, tree condition and horticultural site suitability. Often, secondary insects, diseases or drought will kill a tree which has been stressed by defoliation (Dunbar and Stephens 1975).

Case Studies

There is little available information regarding the impact of mixed-species Ardeid colonies on mature oaks. These bird species will nest in a large variety of different tree and shrub species that occur in their breeding range. In tropical areas, it's typical to find nesting colonies in mangroves. In central California, they can also be found nesting in eucalyptus trees and coast redwoods. One of the best documented cases of the effects of nesting egrets and herons on oaks was studied by Ray C. Telfair on islands in Cedar Creek Reservoir in Texas (see below), where he saw a rapid decline in the oak population following heron colony establishment.

Examples of herons nesting in oaks in Mediterranean climates have been observed but undocumented in Spain and California. Cork oaks at the Coto Doñana Preserve in southern Spain have suffered serious mortalities as a result of a very large, longstanding colony of mixed Ardeids (JJ Chans, personal communication). On the other hand, Audubon Canyon Ranch Heron and Egret Project researchers report that a large oak in Suisun Marsh, California, has supported over sixty nests over the past decade with no apparent ill effects (JP Kelly and M McCaustland, personal communication). Although there are several documented cases of tree damage and death caused by large aggregations of nesting herons and egrets, this outcome is not guaranteed. All of these cases occurred in wildland areas where no attempt was made to alleviate the damage inflicted on the trees by the colony.

Cedar Creek Reservoir, Texas

Located in northeast Texas, Cedar Creek Reservoir has been home to a mixed species breeding colony of birds since 1972. Bird breeding has been centered on two islands in the reservoir, Bird Island and Telfair Island, where nesting species have included Neotropic Cormorant, Great Egret, Snowy Egret, Little Blue Heron, Tricolored Heron, Cattle Egret, and Black-crowned Night Heron. Ray C. Telfair, a researcher with the Texas Parks and Wildlife Department, recently reported on a 28-year study of Cattle Egrets on the islands (2004), where he tracked breeding of the birds and long-term changes in nest-site vegetation. The original vegetation of the islands consisted of grasslands, post oak (*Quercus stellata*) savannah with scattered large trees, and thickets of shrubs and closely spaced tree saplings. The thicket areas were most popular for nesting and consisted primarily of post oak (*Quercus stellata*), winged elm (*Ulmus alata*), green ash (*Fraxinus pennsylvanica*), and honey locust (*Gleditsia triacanthos*).

Colony monitoring started in 1974, and by 1975, 85% of the plants in the thickets of preferred nesting vegetation and the tall roost trees in the post oak savannah on Telfair Island were dead. Telfair took annual photographs of the nest site vegetation to record the changes he observed. He found that birds would continue to nest in the leafless skeletons of dead trees. As the native vegetation died, the birds began bringing in twigs and nesting materials from the nearby mainland. By flying in fruit-bearing twigs of the umbrella chinaberry (*Melia azedarach* f. *umbraculiformis*) for nest construction, Cattle Egrets introduced this Asian tree to the islands. By 1980, most of the native guano-intolerant vegetation on the island had been replaced by guano-tolerant umbrella chinaberry and eastern red cedar (*Juniperus virginianus*), which became the new host vegetation for nesting. After 1985, even these more tolerant species began to die, and by 2000, almost all the nest-site vegetation on Bird Island had died. Telfair attributed the plant death to "overfertilization from guanotrophy."

Based on his observations, Telfair has developed a rating for the tolerance of various plant species to guanotrophy (1983). The most tolerant species, such as the chinaberry, can support high nest densities for 11 or 12 years. He called all the oak species he rated "intolerant…dying within 1 or 2 years." Oak species mentioned included post oak (*Quercus stellata*), blackjack oak (*Q. marilandica*) , water oak (*Q. nigra*), and willow oak (*Q. phellos*).

Pea Patch Island, Delaware

Pea Patch Island is located in the Delaware River, about 16 km south of Wilmington, Delaware. A very large mixed species heron colony was found to have a dramatic impact on host vegetation on the island in 1975 and 1976 (Wiese 1978). Records of the colony date back to 1964 when 900 nesting pairs were counted. After several years of nest counts ranging from 1500 to 2000, the colony ballooned to 8,000 nests in 1974 and held at 7,500 for the following two years. Cattle Egrets made up more than half of the expanded colony, and other dominant species included Glossy Ibis, Black-crowned Night Heron, Snowy Egret, and Little Blue Heron. Blueberry shrubs (Vaccinium sp.) were the preferred host vegetation for the birds. By the end of the 1975 nesting season the blueberries in the most heavily used nesting areas were dead, and the ground underneath them (which had been covered with herbaceous vegetation) was bare. The death of host shrubs in this area prompted half the heronry to occupy a previously unused area for nesting in 1976. At the end of the 1976 nesting season, Weise (1978) found that in the previously unused area of blueberry shrubs, "after only one nesting season, 60 percent of the shrubs were defoliated and 8 percent were killed."

Soil tests in the new nesting area revealed an increase in pH and a 12-fold increase in soluble salts over the course of the nesting season. Wiese attributed the defoliation and death of the blueberry shrubs and their undergrowth to excessive accumulation of salts in the soil. In reviewing his own study and other published studies on herons, Wiese noted that although moderate concentrations of guano were beneficial for some plant species and acted as a fertilizer, high concentrations of guano were harmful to all plant growth.

10.1.3 Shields Oak Grove Study Results

The UC Davis Arboretum horticultural staff has been monitoring the effects of the heronry on the tree collection in Shields Oak Grove since 2003. Assessing tree health can be challenging, and most arborists use a multi-point assessment system that is typically limited in scope by what can be viewed from the ground with a somewhat subjective visual check. Assessing tree longevity and predicting the life span of a tree with compromised health is even more difficult. In attempting to understand the impact of the birds on the trees, Arboretum staff and their partners have studied nest density, changes in the appearance of tree canopies, aerial photographs of the grove, tree metabolic indicators, changes in soil chemistry, and tree increment cores. Most of these studies clearly indicate that the condition of the trees has been negatively affected by the heronry. The rate of their health decline is difficult to predict and will depend on the density of nesting and the implementation of horticultural mitigation measures.

Nest Density

Nest density is a key factor that determines the level of impact heronries have on their nest site vegetation. Greater nest densities are clearly linked with more rapid and severe damage to vegetation. Nest densities can also be compared to other documented heronries to assess the potential for vegetation damage. Annual active nest counts have been tallied for each tree in Shields Oak Grove by the UC Davis Museum of Wildlife and Fish Biology biomonitoring staff since 2005. In 2007, UC Davis Arboretum curatorial staff measured the canopy radius of each tree in Shields Oak Grove. Nest counts can be divided by canopy area to give an indicator of nest density per tree.

In the 64 trees with active nests in 2008, the average nest count per tree was 11.4 and the average nest density per tree was 0.107 nests per square meter. In the ten trees with the

highest nest densities, average nest density per tree was 0 .409 nests per square meter. The single tree with the greatest nest density had 1.06 nests per square meter. On the islands in Cedar Creek Reservoir, peak nest densities between 0.5 and 0.75 nests per square meter resulted in the death of oaks within one to three years (Telfair & Bister 2004). Nest densities between 0.25 and 0.375 nests per square meter resulted in the death of guano-tolerant chinaberries over the course of 15 years. Nest densities in the more heavily occupied trees in Shields Oak Grove meet or exceed nest densities found to cause tree death at Cedar Creek Reservoir, which raises concerns about the threat to the health of those trees. On Pea Patch Island, nest densities greater that 1.3 nests per meter resulted in rapid destruction of nest site vegetation (Wiese 1978). Nest densities in Shields Oak Grove do not yet approach those found on Pea Patch Island.

Tree Canopies

The most visible effect of the heronry on the trees in Shields Grove is canopy thinning. UC Davis Arboretum horticulture staff and consulting arborist John Lichter have observed the foliage under nests being whitewashed with guano. It is unclear whether leaf drop is caused by shading of the foliage by the guano or by chemicals in the guano (such as ammonia), but defoliation under nests is quite apparent. In the more heavily nested trees, branch death under nests is the ultimate result of repeated defoliation. Surprisingly, outer tree branch tips above the nests appear relatively healthy. Guano deposition from bird nesting is resulting in an alteration of the natural canopy architecture of preferred nesting trees. As interior branches and foliage are killed off, the tree canopy becomes thinner, and active growth is restricted to a thin veneer at the outer edges of the canopy. This change in canopy structure is of particular concern for the Arboretum, because the tree collection is intended to serve as a living museum exhibit and reference collection that illustrates the natural forms of a broad variety of oaks, many of which are uncommon in cultivation.

In August of 2008, John Lichter updated the Arboretum staff on his personal observations of the effect of the heronry on the tree canopies in Shields Oak Grove. Lichter was hired to evaluate each tree in the collection for a conservation project in 2003. Since then, he has regularly worked on smaller projects in the collection and has served as the Arboretum's main consultant for matters relating to tree health. He has observed that the impact of the birds is spreading in the tree collection both in terms of the number of trees affected and in the effect on individual trees. He has also noticed an increase in deadwood under nests in the grove, and the deadwood appears to include larger branches than he has previously observed. According to Lichter, bird nesting "is definitely altering the structure of the trees." Although the impact on the appearance of the trees is clear, what remains uncertain is how the canopy thinning will ultimately affect tree health and longevity.

Figure 1. Leaves coated with guano

Figure 2. Defoliated branches underneath nests

Figure 3. View of Quercus agrifolia in Shields Grove in 2003. Note whitewashing of foliage.

Figure 4. Same view as in Figure 3 above taken in 2006. Note thinning of canopy interior.

Aerial Photographs

Color infrared aerial photographs are frequently used for analyzing vegetation on a broad scale. In these photographs red tones are associated with live vegetation, and the shade and intensity of color is an indicator of the density and vigor of vegetation. Dense, rapidly growing vegetation will show up as very intense reds. Sparse or low vigor vegetation will show up as light red or pink (USGS 2008). Infrared photos of Shields Oak Grove were obtained from 1995 (before the heronry formed) and 2003 (when the heronry was starting to rapidly expand) for comparison. Researchers at the UC Davis Center for Spatial Technologies and Remote Sensing attempted to make a quantitative comparison of the photographs, but the difference in photographic equipment used to make the two images made it impossible. Even without a quantitative analysis, qualitative comparison of the photos still reveals a clear visual pattern. In the 1995 photo, the oak canopies in Shields Oak Grove are fairly uniform in color appearance with mid to dark reds. In the 2003 photo, the effect of heron nesting is quite apparent. Canopy areas that contain a high concentration of nests appear pink or white and stand in stark contrast to healthy canopy areas that are bright red. The pale color of the aerial photos in the nesting areas is a strong indicator that the birds are having a negative impact on tree growth and vigor.

Tree Metabolic Indicator – Chlorophyll Fluorescence

Symptoms of stress in plants include both visible changes (such as wilting or leaf burn) and metabolic ones that often result in reduced growth. Chlorophyll fluorescence is a metabolic indicator that is used to measure the efficiency and functionality of the photosynthetic apparatus in plants. The chlorophyll fluorescence profile for a leaf indicates the efficiency of photosystem II. Electrons moving through photosystem II fluoresce red light as they move between different states of excitation. The fluorescence profile changes when some of "the photosystem II reaction centers are damaged, a phenomenon called photoinhibition, often observed in plants under stress conditions" (Fracheboud 2008). Chlorophyll fluorescence has been identified as a promising tool for diagnosing and quantifying damage to the photosynthetic apparatus in response to environmental stress.

Chlorophyll fluorescence readings were taken from at least six leaves each from three different coast live oak (*Quercus agrifolia*) trees with varying levels of bird activity. The study trees included a control tree (M) from the Mediterranean Section with no nesting activity, tree 13 from Shields Oak Grove which had 28.3 average peak active nests in 2005, and tree 22 from Shields Oak Grove which had 6.9 average peak active nests in 2005. All three trees were of similar age and were growing in similar environmental conditions. Readings were taken on February 14, 2006 when drought stress would not be a factor before the spring nesting season began. Readings are typically expressed as Fv/Fm, with measurements of 0.78 to 0.85 being associated with healthy, non-stressed trees (Demming and Bjorkman 1987, Maki and Colombo 2001, Percival 2004). Measurements below 0.78 are associated with trees experiencing stress. Average readings for the three trees are summarized in Figure 7 below. Although these results should be considered preliminary due to the small sample size and limited time frame of the study, they do indicate that tree 13, the tree with the highest nesting level, was undergoing the most stress.

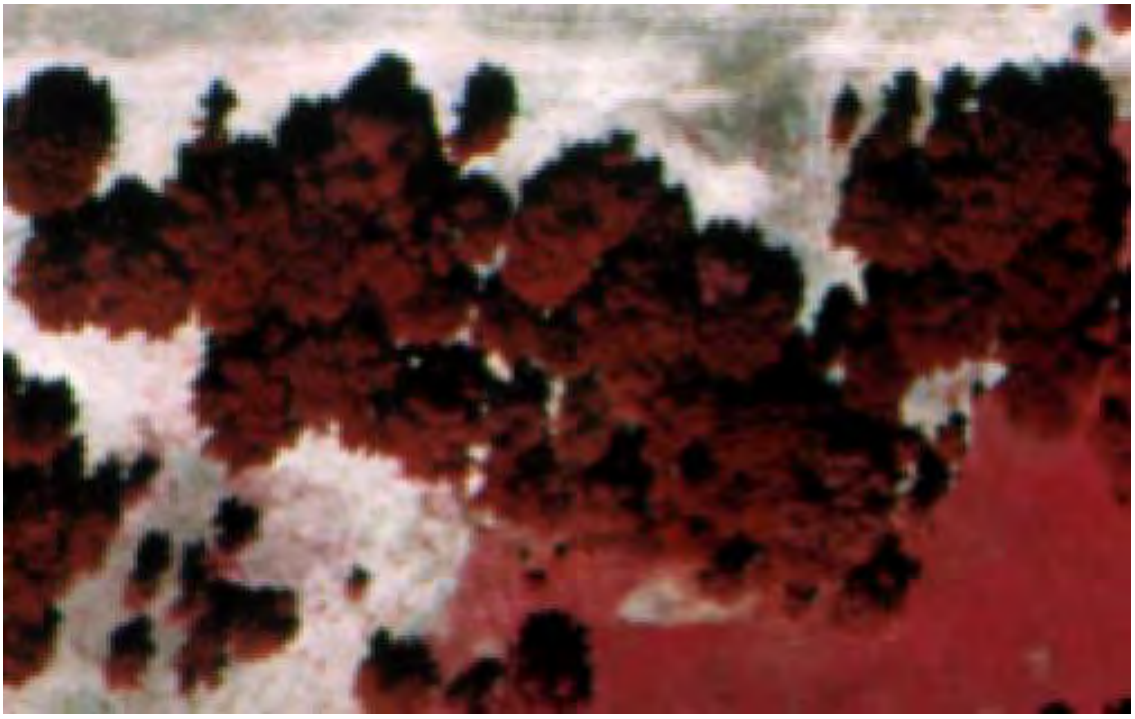


Figure 5. Color infrared aerial photograph of the north end of Shields Oak Grove from 1995. Note consistent red color of tree canopies.

Figure 6. Color infrared aerial photograph of the north end of Shields Oak Grove from 2003. Note pale pink color of tree canopies in areas with dense bird nesting activity.

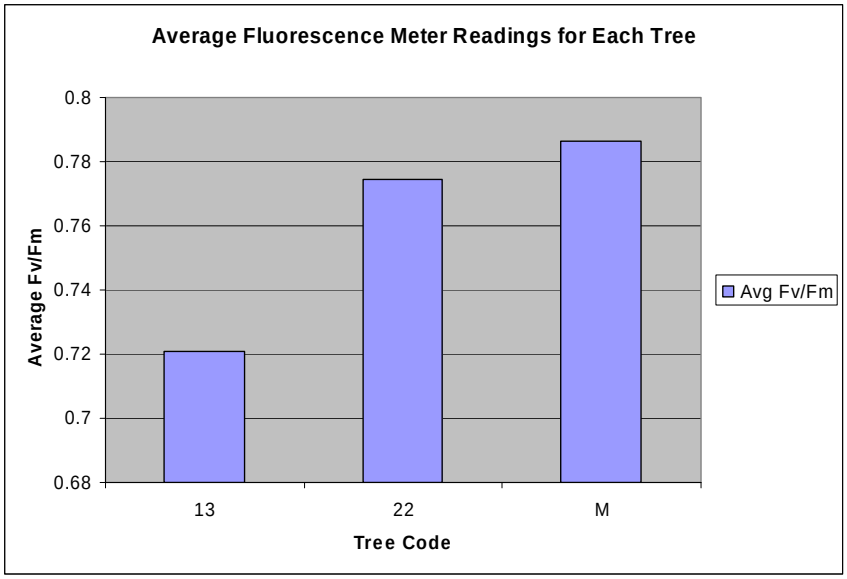


Figure 7. Average of chlorophyll fluorescence meter readings from 6 or more leaves from trees 13 and 22 in Shields Oak Grove and Tree M in the Mediterranean Collection.

Figure 8. Taking leaf readings with the chlorophyll fluorescence reader in Shields Oak Grove.

Soil Chemistry

The accumulation of guano under nesting colonies and associated chemical changes in the soil are referred to as guanotrophy. Heron guano is rich in the plant macronutrients of nitrogen, phosphorous, and potassium, and is harvested as a source of fertilizer in some parts of the world. When present in higher concentrations, however, salts from these nutrients can cause plant damage. The total concentration of ions in the soil determines the salinity of the soil. Common ions include chlorides, sulfates, nitrates, phosphates, calcium, magnesium, sodium, potassium, ammonium, and more. The concentration of ions is measured as electrical conductivity (EC), and an EC in excess of 3 mmhos/cm is considered saline. Some individual

ions, such as chloride, sodium, boron, and ammonium, are particularly toxic and can cause injury to sensitive plants when they reach critical levels regardless of soil salinity (Costello et al 2003).

Symptoms of mild salt damage include stunted or reduced growth and foliage yellowing. More extensive damage results in leaf necrosis and defoliation. Costello et al offer a guide to the effects of salinity on plants in their recent book *Abiotic Disorders of Landscape Plants: A Diagnostic Guide*(2003). They describe the symptoms of root-absorbed salts as follows: "The symptoms are usually most severe on the edges and tips of older leaves where the greatest salt accumulation occurs and less severe on new foliage…In severe cases, plants are killed. The degree of symptoms depends on the sensitivity of the plant to salts and the concentration of accumulated salts in the soil."

The sensitivity of oaks to salts appears to vary widely by species. Of the eight oak species listed in Costello et al, two were considered to have low salinity tolerance, three to have moderate tolerance, and three to have high tolerance. Soil salinity (EC) levels of 0.5 to 2.0 mmhos/cm are considered generally safe for most plants. Levels between 2.0 and 4.0 mmhos/cm are considered slight to moderate, and levels above 4.0 mmhos/cm are considered severe.

Soil samples were first taken in August of 2003 by John Lichter in high and medium nest density areas and a control area with no nesting. Starting in spring of 2005 and ending in spring of 2007, samples were taken at the beginning and end of each nesting cycle to track soil changes. A final set of samples was taken at the end of the nesting season in fall of 2008. Not surprisingly, soil samples in higher bird activity areas systematically show elevated levels of nitrate, phosphorous, and potassium and higher EC measurements than control samples. The soil pH is also markedly reduced in areas with bird activity. EC measurements for samples from the single highest bird activity area were found to exceed 4.0 mmhos/cm (considered severe level) in 2003, spring and fall of 2005, and fall of 2006. Samples from this area had reduced EC levels in spring of 2006 and spring of 2007, presumably due to the heavy leaching rains during the two previous winters.

There is no chemical amendment, conditioner, or fertilizer that can be used to remediate saline soils. Leaching of salts to below the plant root zone through heavy rainfall or deep irrigation with good quality water is the primary method used to reclaim saline soils. The installation of an automated irrigation system in Shields Oak Grove in summer of 2006 allows the Arboretum to apply irrigation more easily for leaching purposes. Deep, infrequent irrigations in Shields Oak Grove provide leaching of salts that would not occur in a natural environment and help prevent salt build-up on the soil surface. Leaching salts to below the root zone may prove challenging, however, because roots have been found to grow at least four feet deep in the soil profile in the grove (Lichter 2003).

Increment Cores

The width of annual growth increments (or tree rings) of a tree trunk are used as a measure of tree health and vigor by dendrochronologists. Increment cores of wood allow researchers to study the changes in annual growth increments over time, providing a historic look at the condition of the tree each year through time. In June and July, 2005, John Lichter and his associate Dan Quickert cored eight coast live oaks (*Quercus agrifolia*) within the Shields Oak grove and six *Q. agrifolia* outside of the grove in the arboretum's Mediterranean Collection to measure radial increment growth and determine whether a relationship existed between bird nesting and the growth rate of the trees. Trees outside of the grove contained no active nests. Trees cored within the grove included the following trees with the number of average peak active nests listed for each tree.

Tree #	Average Peak Active Nests in 2005
12	8.6
13	28.3
15	14.9
22	6.9
23	12.8
34	25.5
62	1.9
70	17.8

Figure 9. 2005 nest tallies for Shields Oak Grove study trees

Cores were mounted, dried, sanded with sand paper and later with a Dremel tool for analysis. Growth rings were measured and data are presented below.

The average radial growth of coast live oak outside of the grove exceeded that within the grove for every year between 1996 through 2005. Since 2002, the growth rate of trees within the grove increased every year except for 2005 (which may be due to the fact that only a partial year's growth was "captured" within the core). By excluding the trees with lower numbers of nests (62, 22, and 12), the increase in growth rate over the period since 2003 becomes more dramatic. These results suggest that the oak trees with more nests grew faster since the heron colony became established than the oaks with fewer nests.

There have been two significant changes to the Shields Oak Grove trees since 1996, 1) changes in irrigation and 2) bird use. Since 2002, the number of trees irrigated and the frequency and duration of irrigation has increased dramatically (Duane Goosen, personal communication). This change corresponded to the time when birds inhabited the grove in significant numbers. Unfortunately, it is not possible to isolate the effect of these two variables on annual increment growth.

Irrigation can have a dramatic effect on the growth rate of trees within the Central Valley. Therefore, the increases in the growth rate of the trees sampled since 2002 could be related to this change in their management. The guano deposited by the birds could also have had a stimulating effect, due to the amounts of nitrogen deposited in the soils. It is also possible that the level of salts in the soil and the defoliation caused by the guano has had a negative effect on the growth rate of the trees and, had the birds not been present, the stimulating effect of irrigation on the growth rate could have been greater than it was.

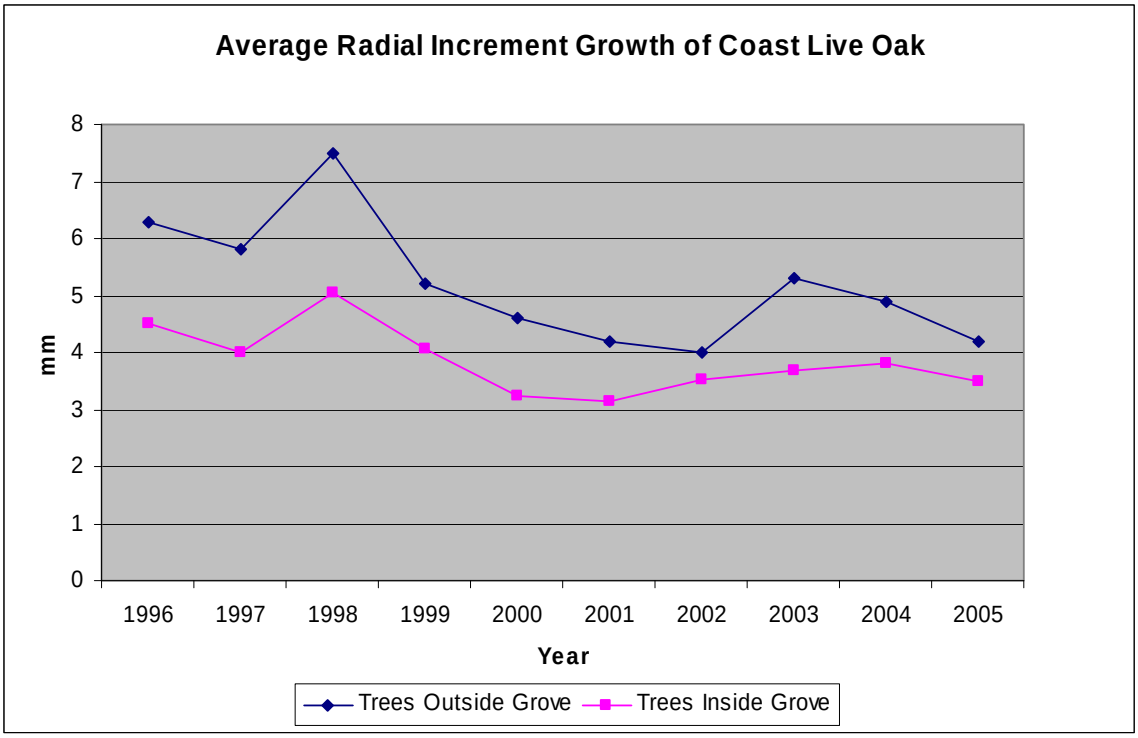


Figure 10. Average Radial Increment Growth of Q. agrifolia inside and outside Shields Oak Grove.

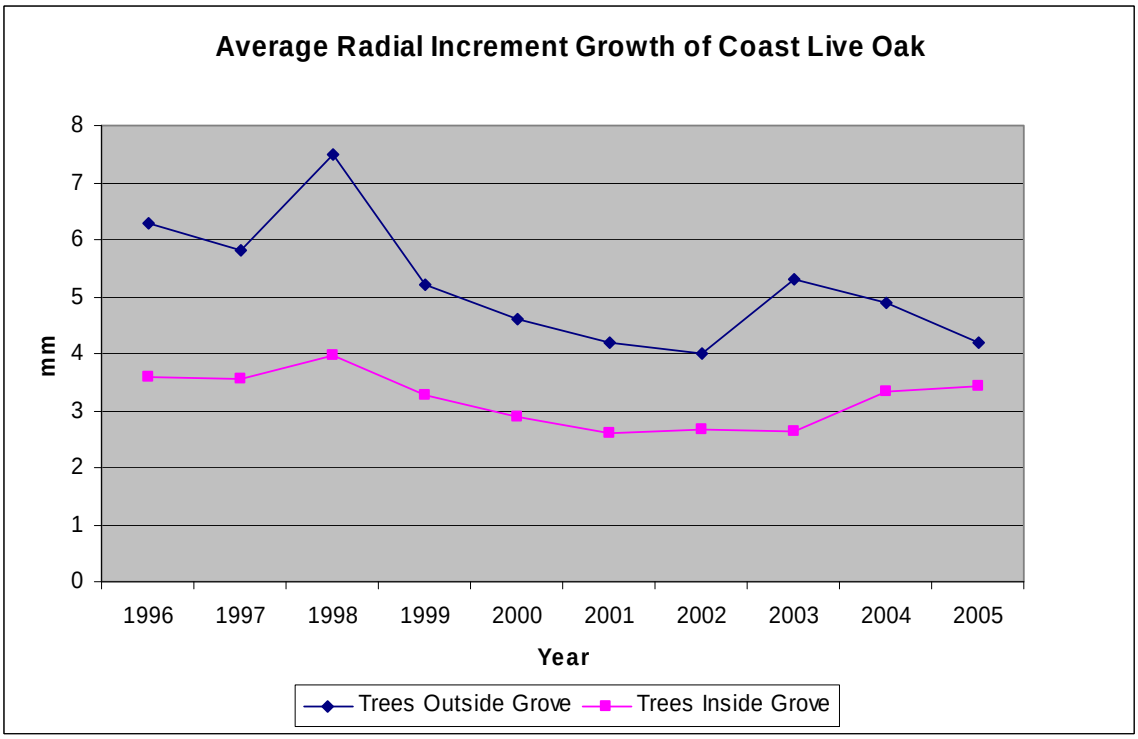


Figure 11. Average Radial Increment Growth of Q. agrifolia outside grove and trees inside grove with greater than 8.6 nests/tree.

Had the growth rate of the grove trees declined significantly since the birds populated the grove, this would have supported the contention that the birds were negatively affecting the tree's

growth. Due to the confounding factor of increased irrigation it is unclear what effect guano deposition has had on tree growth.

10.1.4 Conclusions

A review of the literature on heronries reveals many studies where birds have been found to cause death or substantial damage to nest vegetation. The large quantity of guano produced by nesting colonies has the potential to cause defoliation and dieback of stems and an increase in soil salinity that stunts or kills plant growth. The rate and severity of damage depends on the density of nesting and the guano tolerance of the nest vegetation.

Studies in Shields Oak Grove show clear evidence of damage and stress caused by the heron colony. The current nest density in heavily occupied trees exceeds the density that caused oak tree death in Texas. Observations from the ground have found extensive defoliation and branch death under nests in heavily occupied trees, resulting in a thinning of tree canopies and a significant change in canopy architecture. Aerial photographs have revealed that nesting is causing a visible reduction in tree growth and vigor. Preliminary studies using chlorophyll fluorescence as a metabolic indicator have indicated that a tree with many nests was undergoing more environmental stress than a control tree without nests. Salt accumulation in the soil is known to stress and sometimes kill plants, and soil samples from areas with heavy bird nesting have been found to exceed severe salinity levels. Deep irrigation and heavy rainfall can help mitigate and suppress rising salinity, but it's unclear whether leaching can be sufficient to push salts below the rooting depth of oaks in the soil profile. Drought and declining irrigation water quality may also affect our ability to effectively leach. If nesting continues at current levels, it is likely that increased damage and stress will occur in the oak collection that will ultimately result in premature tree death.

10.1.5 Acknowledgements

This paper draws substantially from the work of Amanda Castaneda and Melanie Truan on the Arboretum Wildlife Management and Enhancement Plan. John Lichter contributed greatly to the studies on Shields Oak Grove tree health, particularly the increment core study.

10.1.6 Literature Cited

Arendt WJ, Arendt AI. 1988. Aspects of the breeding biology of the Cattle Egret (*Bubulcus ibis*) in Montserrat, West Indies, and its impact on nest vegetation. Colonial Waterbirds. 11(1): 72-84.

Baxter GS, Fairweather PG. 1994. Phosphorous and nitrogen in wetlands with and without egret colonies. Australian Journal of Ecology. 19: 409-416.

Belzer WR, Lombardi JR. 1989. Cattle egret symbiosis and heronry abandonment. Colonial Waterbirds. 12(1): 115-117.

Castaneda AE, Truan MA. 2006. UC Davis Arboretum Wildlife Management and Enhancement Plan. Museum of Wildlife and Fish Biology. University of California, Davis, CA.

Costello LR, Perry EJ, Matheny NP, Henry JM, Geisel PM. 2003. Abiotic Disorders of Landscape Plants: A Diagnostic Guide. University of California Agriculture and Natural Resources. Publication 3420. Oakland, CA.

Demmig B, Bjorkman O. 1987. Comparison of the effect of excessive light on chlorophyll fluorescence 77K and photon yield of oxygen evolution in leaves of higher plants. Planta (Heidelberg). 171(2): 171-184.

Dunbar DM, Stephens GR. 1975. Association of two-lined chestnut borer and shoestring fungus with mortality of defoliated oak in Connecticut. Forest Science. 21(2): 169-174.

Dusi JL, Dusi RD. 1987. A thirty-four year summary of the status of heron colony sites in the coastal plain of Alabama, USA. Colonial Waterbirds. 10(1): 27-37.

Fracheboud Y. 2006. Using chlorophyll fluorescence to study photosynthesis. Institute of Plant Sciences ETH, Universitatstrasse 2, CH-8092, Zurich. Web address: http://www.ab.ipw.agrl.ethz.ch/~yfracheb/flex.pdf. Accessed 9/15/2006.

Gilmore AR, Gertner GZ, Rolfe GL. 1984. Soil chemical changes associated with roosting birds. Soil Science. 138(2): 158-163.

Hobara S, Koba K, Osono T, Tokuchi N, Ishida A, Kameda K. 2005. Nitrogen and phosphorous enrichment and balance in forests colonized by cormorants: implications of the influence of soil absorption. Plant and Soil. 268: 89-101.

Jenni DA. 1969. A study of the ecology of four species of herons during the breeding season at Lake Alice, Alachua County, Florida. Ecological Monographs. 39: 245-270.

Johnson WT, Lyon HH. 1988. Insects that Feed on Trees and Shrubs, 2nd ed. Ithaca, NY: Comstock.

Lichter JM. 2003. Tree Evaluation, Horticultural Site Assessment, and Management Recommendations for the Shields Oak Grove, University Arboretum, University of California, Davis. Prepared for the University Arboretum, University of California, Davis, California by Tree Associates, 3963 Central Lane, Winters, California, 95694. October 6, 2003.

Ligeza S, Smal H. 2003. Accumulation of nutrients in soils affected by perennial colonies of piscivorous birds with reference to biogeochemical cycles of elements. Chemosphere. 52: 595-602.

Maki DS, Columbo SJ. 2001. Early detection of the effects of warm storage on conifer seedlings using physiological tests. For. Ecol. Manage. 154: 237-249.

Mun HT. 1997. Effects of colony nesting of *Ardea cinerea* and *Egreta alba modesta* on soil properties and herb layer composition in a *Pinus densiflora* forest. Plant and Soil. 197: 55-59.

Percival GC. 2004. Evaluation of physiological tests as predictors of young tree establishment and growth. Journal of Arboriculture. 30(2): 80-91.

Telfair RC II, Bister TJ. 2004. Long-term breeding success of the Cattle Egret in Texas. Waterbirds. 27(1): 69-78.

Telfair RC II. 1983. The Cattle Egret: A Texas focus and World View. The Kleberg Studies in Natural Resources. Texas Agricultural Experiment Station. Texas A&M University System. College Station, Texas.

Telfair RC II. 2006. Cattle Egret (Bubulcus ibis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/113

USGS. 2008. Frequently Asked Questions. Web address: http://www.usgs.gov/faq/list_faq_by_category/get_answer.asp?id=336). Accessed 11/30/2008.

Wesoleh DV, Brown RT. 1971. Plant distribution within a heron rookery. American Midland Naturalist. 86(1): 57-64.

Wiese JH. 1978. Heron nest-site selection and its ecological effects. In: Sprunt A IV, Ogden JC, Winckler S, editors. 1978. Wading Birds. Report number 7. New York: National Audubon Society. 27-34.

Appendices Available:

Soil test results
Expert opinion letters
Nest density chart

APPENDIX C
COMMENTS AND RESPONSES TO COMMENTS

COMMENTS AND RESPONES TO COMMENTS

The Draft Initial Study and Proposed Mitigated Negative Declaration were available for public comment from January 17, 2009 to February 17, 2009. Comments received include the following:

- Yolo-Solano Air Quality Management District
- Paul Kelly, Davis Resident
- Chad Roberts, Conservation Chair, Yolo Audubon Society

The comment letters and responses to the comment letters are provided on the following pages.

1947 Galileo Ct., Suite 103 • Davis, California 95618

(530) 757-3650 • (800) 287-3650 • Fax (530) 757-3670

January 23, 2009

John A. Meyer
Vice Chancellor – Resource Management and Planning
University of California
One Shields Avenue
376 Mrak Hall
Davis, CA 95616

Re: UC Davis Arboretum Heron Colony Management – Notice of Intent to Adopt a Mitigated Negative Declaration – Comments

Dear Mr. Meyer:

The Yolo-Solano Air Quality Management District (District) appreciates the opportunity to review the Notice of Intent (NOI) to adopt a Mitigated Negative Declaration (MND) for the above referenced project. The project involves the implementation of pyrotechnics, bio-acoustics, and handheld lasers to deter herons from nesting in the Shields Oak Grove. The Shields Oak Grove is a nationally recognized collection of oaks that is a learning resource for the university and the public. Over the past years, the nesting herons have been found to adversely affect tree health through removal of leaves and foliage for nesting and deposition of guano. In efforts of preserving the oaks, the university has proposed the heron colony management plan to prevent herons from reaching the egg laying stage in the nesting cycle.

As a commenting agency under the California Environmental Quality Act, the District has reviewed the MND, and does not have any comments to offer at this time. 1.

On a side note, the District would like to point out that independent of the CEQA process, the following District Rules and Regulations might apply to the project:

- Portable diesel fueled equipment greater than 50 horsepower (HP), such as generators or pumps, must be registered with either the Air Resources Board's (ARB's) Portable Equipment Registration Program (PERP) (http://www.arb.ca.gov/perp/perp.htm) or with the District.

- Dust emissions must be prevented from creating a nuisance to surrounding properties as regulated under District Rule 2.5, NUISANCE.

In conclusion, the District appreciates receiving the MND and the opportunity to provide recommendations. If you have any questions, please contact me at (530) 757-3668.

Sincerely,

Matthew R Jones

Matthew R. Jones
Supervising Air Quality Planner

Response to Yolo-Solano Air Quality Management District

The numbered responses correspond to the large bold comment numbering found on the right side of the comment letter.

1. No response provided, comment letter indicates that the Yolo-Solano Air Quality Management District has no comments on the proposed project.

Paul R. Kelly
2136 Dinosaur Place
Davis, CA 95616

February 17, 2009

John A. Meyer
Vice-Chancellor- Resource Management and Planning
University of California, Davis

Dear Mr. Meyer,

I am submitting these comments in response to the Draft Initial Study ("DIS") and the proposed Negative Declaration that was prepared by the University of California, Davis ("UCD") as required by CEQA for the project entitled "Arboretum Heron Colony Management Project." Based upon UCD's analysis of their DIS, UCD has determined that a Mitigated Negative Declaration will be adopted for this project. The DIS identifies two categories of potentially significant impacts including potential impacts to burrowing owls and to the nearby equestrian center.

Unfortunately the DIS fails to describe the most obvious and serious significant impact of all. Namely, the project eliminates a locally and regionally important egret and heron colony. The DIS should be expanded and revised to address this significant impact and other impacts described below. Mitigation measures should be developed to address these significant impacts. Therefore, a revised DIS should be prepared which includes the following: 1.

1. the exact location and protection status of the few great egret and snowy egret colonies in Yolo and Solano Counties; 2.

2. the future viability of the Road 103 colony as it resides on private land where nesting trees have no legal protection outside the nesting season, and the probable carrying capacity of this colony; 3.

3. the factors responsible for the formation of the arboretum colony and steps to be taken if the birds relocate to other "scientifically unique" trees in the arboretum; 4.

4. the feasibility of the establishment of a new colony site at another location on the UCD campus through the use of appropriate social attraction techniques; 5.

5. the benefits of managing the colony on campus to educate and enrich the residents of Davis and the public that visit UCD; 6.

6. the local ecological consequences of the loss of the arboretum colony, and the loss of scientific research opportunities; and 7.

7. the potential population impacts that could occur due to the cumulative effects of stressing a colony that is infected with West Nile Virus. 8.

Below I address each of these seven points in succession.

Local and Regional Great Egret and Snowy Egret Colonies

The DIS failed to provide a complete local and regional context for the proposed elimination of the colony. How would the loss of this colony affect our local and regional avifauna? UCD should identify the location and status (protected or unprotected) of great egret and snowy egret breeding colonies in Yolo and Solano Counties in order to enable the public to understand the regional conservation status of these two species, and the regional consequences of the elimination of the arboretum colony. I am emphasizing the great egret and snowy egret because colonies of these two species in the Central Valley are relatively uncommon, especially in protected settings. The great egret is less likely than other species of egrets to cope with the elimination of the arboretum colony and less likely to relocate successfully. 9.

The Road 103 Colony

The DIS suggests that egrets and herons may relocate to other colonies such as the colony on Yolo County Road 103 about eight (8) miles away from the arboretum. No other potential receiver colony for great egrets and snowy egrets is mentioned for Yolo or Solano Counties. The DIS fails to acknowledge that the Road 103 colony is located on private land that may not offer any protection for breeding birds in future years and is not accessible to the public. All the nesting trees (eucalyptus) on this private land could be legally removed outside the nesting season. This dilemma underscores the responsibility of UCD to identify alternative great egret and snowy egret colony sites on public lands where these species can be effectively managed and protected in future breeding seasons. 10.

In addition, it is simplistic to assume that the arboretum colony will relocate to the Road 103 colony and be absorbed without first gaining some understanding of the disturbance history at that site and the carrying capacity of that colony. What is the productivity (young per nest) of great egrets at the Road 103 colony relative to the arboretum colony? Where are the foraging areas for great egrets nesting at the Road 103 colony? Are those foraging areas already functioning at their carrying capacity? Absent research to shed light on these questions and absent proactive management of great and snowy egrets, the 11.

elimination of the arboretum colony may significantly compromise productivity and eventually reduce local and regional populations of great egrets and snowy egrets.

Understanding the Arboretum's Attractants

UCD should identify the factors that attracted the egrets to the arboretum initially. Perhaps the arboretum offered protection from predators and human disturbance. Were the birds disturbed at a former colony site and forced to relocate to the arboretum? With an understanding of the factors responsible for the arboretum colony formation, UCD could undertake an informed evaluation of potential relocation sites such as the south fork of Putah Creek in the UCD Reserve. 12.

Moreover, the DIS should describe the actions to be taken if the egrets and herons simply relocate to other trees in the arboretum. Would there continue to be costs and environmental impacts associated with hazing actions undertaken to force the birds from other arboretum locations? These uncertainties underscore the importance of identifying a site where the egrets and herons can be managed and protected effectively. 13.

Relocating the Arboretum Colony

Social attraction techniques utilizing artificial nests, decoys and recorded courtship calls have been used successfully with a variety of colonial waterbirds including terns, flamingos, puffins and murres to re-establish and to relocate colonies out of harms way. Expertise is available at UCD to assist the arboretum with such a project. It would be irresponsible for UCD and inconsistent with UCD's mission to forgo the opportunity to apply an innovative scientific approach to solve this environmental challenge. Absent a coordinated strategy for relocating the colony, the use of hazing alone is a crude tool. 14.

Public Enjoyment and Enrichment – Recreational Benefits

Residents of the City of Davis, and Yolo and Solano Counties enjoy viewing great egrets foraging in the arboretum, at the north and west Davis wetlands, in the Highway 113 median and along local flood water channels. Will the public be deprived of the opportunity to enjoy these majestic predators in future years? How does UDC propose to mitigate the loss of the significant recreational uses associated with the viewing and enjoyment of egrets in and around Davis? During past breeding seasons I have regularly encountered bird watchers, curious visitors and nature photographers viewing the spectacle of egret courtship and chick feeding at the arboretum colony. How will UCD mitigate the loss of the significant economic benefits associated with this recreational use? 15.

Audubon Canyon Ranch in Marin County hosts thousands of school children and tourists annually to view nesting great egrets. If UCD were to manage a great egret colony in an appropriate setting, with viewing platform and interpretative services, it could provide a

valuable complement to the U.C. Putah Creek Reserve, draw visitors to UCD and Davis, and augment the existing visitor experience at the Yolo Bypass Wildlife Area.

Ecologic and Scientific Benefits

How would the loss of the arboretum colony affect the ecological relationships of predators and prey in and around Davis? The great egret is an effective predator on native and non-native rodents and native and non-native fish. How will the elimination of this top predator from the Davis area during the nesting season affect populations of prey species in and around Davis? I routinely encounter three or four great egrets foraging along the arboretum waterway during the nesting and non-nesting season. It is likely that these birds are associated with the arboretum colony. It is likely that great egrets provide a measure of natural control of black rats, non-native fish, domesticated ducks and other pests in the arboretum.

16.

The DIS should address the potential loss of a scientifically significant biological resource. As top predators, the great egrets frequent lands and waters around Davis that are exposed to a host of pollutants from urban runoff, agricultural pesticides, treated sewage, landfill leachates and other sources. The great egrets serve as sensitive environmental indicators as they sample rodent and fish in our region and bioaccumulate pollutants. What are the reproductive effects of the pollutants on the arboretum colony? UCD and the scientific community have the opportunity to sample the blood, tissue and eggs of the great egrets to help us understand the impacts of pollutants in our valley ecosystem. If the colony is eliminated, UCD and the scientific community will lose a valuable scientific research opportunity.

Cumulative Effects

The DIS mentions that some of the egrets and herons tested positive for West Nile Virus. What impact has the virus had on the local and regional egret and heron populations? What are the cumulative impacts to the local and regional great egret population associated with exposure to the virus, compounded by the stresses associated with exposure to a hazing program that could result in total breeding failure in 2009? Are herons and egrets being hazed or otherwise disturbed at other colonies in Yolo and Solano Counties resulting in population impacts?

17.

The DIS states that beginning in 2004 UCD instituted management techniques to discourage birds from nesting in Shields Grove. Who authorized those hazing actions? Why did it take five years for UCD to undertake the preparation of documents to comply with CEQA?

18.

For the reasons mentioned above, the DIS should be expanded and revised to address the significant impacts associated with the elimination of a locally and regionally important egret and heron colony. The revised DIS should describe mitigation measures necessary to offset the loss of important ecological services, recreational uses, and educational and scientific benefits of the arboretum colony. 19.

Sincerely,

Paul R. Kelly

cc: Yolo Audubon
Audubon California
Davis City Council
CDFG
USFWS
Center for Biological Conservation
Sierra Club
Chair, UCD Dept. of Wildlife

RESPONSES TO PAUL KELLY

The numbered responses correspond to the large bold comment numbering found on the right side of the comment letter.

1. The impact to the heron colony located in UC Davis Shields Oak Grove is described and analyzed in section 6.4.3.d of the Arboretum Heron Colony Management Initial Study. The analysis concludes that the impact to the herons is less than significant because the proposed action: (1) would not kill adults, chicks or eggs; (2) the birds would be able to disperse to other nesting locations; and (3) the habitat features present in Shields Oak Grove are not unique and similar habitats are found in the area. Because the impact is identified as less than significant an environmental impact report is not necessary and no mitigation measures are proposed. Please also refer to responses 2-19, below.

2. Based on accounts from California Natural Diversity Data Base and local experts the locations of great and snowy egret colonies within a ten mile radius of the project area and those within the greater region are identified. This information is presented in section 6.4.3.d of the Arboretum Heron Colony Management Initial Study. Heron colony nest trees are not afforded legal protection outside of the nesting season on any lands, public or private, and none of the local colonies are on sites protected by a public or private organization.

3. As noted above, heron colony nest trees are not afforded legal protection outside of the nesting season on any lands, public or private. The future viability of the Road 103 colony cannot be assumed or predicted based on currently available information. Section 6.4.3.d of the Arboretum Heron Colony Management Initial Study does not suggest the birds in the Shields Oak Grove colony would use the colony on Road 103 or other already active colonies. They could disperse to one or more existing colonies or select a new site from the suitable habitat in the region. The discussion of other heron colonies in the vicinity and region is to demonstrate that the establishment of colonies in the area is not rare and that appropriate nesting habitat exists in other locations.

   As described in Section 6.4.3.d, appropriate nesting habitat includes areas of varying sizes with large trees and surrounding land uses can be either rural/open space or more developed areas such as residential neighborhoods. Within the overall Sacramento region, numerous potential nesting sites are available at sites that would not conflict with other land uses such as along rural stream and drainageways. For example, the UC Davis campus manages 5.5 miles of riparian habitat along Putah Creek as a riparian reserve and has an active habitat enhancement program underway. This riparian reserve is 1.5 miles from Shields Grove. For these reasons, the human choices affecting the Road 103 colony, the bird choices affecting the Road 103 colony, and the carrying capacity of the Road 103 site have no bearing on the impact of the proposed project to herons and egrets.

4. Section 6.4.3.d of the Arboretum Heron Colony Management Initial Study discusses the fact that the formation of the arboretum colony is not related to any unique feature of the stand of trees or surrounding area. See comment response 3 for information about the types of appropriate habitat within the Sacramento region. The proposed action to discourage nesting currently would apply solely to the Shields Oak Grove. Heron dissuasion is not proposed for any other trees at UC Davis. Many areas where the colony could relocate would be acceptable (e.g., Putah Creek Riparian Reserve). If the colony was to relocate to a new area on campus that was unsuitable (e.g., for

human health or safety reasons), the campus would develop an appropriate management plan for that site.

5. Information in the literature (summarized in Section 6.4.3.d of the Arboretum Heron Colony Management Initial Study) suggests that these species can and do relocate to other sites. In addition, other colonies are located in the area and potential suitable nesting areas are available in the region. In one instance, a black-crowned night-heron colony was relocated using social attraction techniques in southern California (Crouch et al. 2002). However, in this unique circumstance, the original nesting trees were actually relocated. This approach would be an experimental methodology that has not been demonstrated widely or documented that the herons are successful over the long-term at a new site selected for them by people. The campus concludes that it is best to allow the herons independently select a suitable alternative nesting site(s).

6. The proposed project seeks to protect a unique resource—the Shields Oak Grove for teaching and research purposes related to oak trees. The nesting values of the trees are considered secondary to the primary value as a nationally significant collection of oak trees. Given that the oak trees are declining from nesting activity and are likely to die eventually from the impact of nesting (in which case the birds would move to alternative nesting sites on- or off-campus), UC Davis has concluded that saving the trees and allowing the birds to relocate at this point affords the best protection of the educational opportunities of all resources. Further, the University does not intend to discourage the establishment of a new colony at a suitable site on the UC Davis campus. If the colony was to relocate to a new area on campus that was unsuitable (e.g., for human health or safety reasons), the campus would develop an appropriate management plan for that site.

7. The comment assumes that the birds in the Shields Oak Grove colony will no longer nest in the region when existing evidence indicates that they will relocate to a new nesting area either nearby or elsewhere in the Sacramento region. Given the expected relocation, data indicating that great egrets frequently forage 10 miles from their nesting colonies and up to 20 miles under some conditions (McCrimmon et al. 2001, Custer and Osborn 1978), no local ecological consequences are expected and no scientific research opportunities will be lost. Similarly, snowy egrets will forage up to 12 miles from a nesting colony (Custer and Osborn 1978). UC Davis researchers routinely conduct research on-campus and off-campus at locations close to campus and far from campus.

8. The potential population effects of the proposed project in combination with the known presence of West Nile Virus are expected to be less-than-significant. The arboretum colony is expected to successfully relocate to other available nesting areas in the vicinity. See comment responses 3 and 17.

9. Regarding other colonies in the area and expected relocation in the area, see responses to comment 2 and 7. Regarding the great egret, there is no basis for the statement that great egrets would be less likely to relocate. The example of colony relocation in Oklahoma of approximately 13 miles that included great egrets and snowy egrets is discussed in section 6.4.3.d of the Arboretum Heron Colony Management Initial Study.

10. Section 6.4.3.d of the Arboretum Heron Colony Management Initial Study explains that the egrets and herons are expected either to relocate to a new nesting area or begin using an established

nesting area. UC Davis cannot predict the site where the colony will relocate. See response 3, above, for a discussion of suitable nesting habitat in the region.

11. The Initial Study analysis did not assume that the arboretum colony would relocate to the Road 103 colony. Accordingly, the comment's request for additional information regarding the Road 103 colony is not required. See response to comment 5. Further, as noted in response to comment 7, egrets have been observed foraging between 10-20 miles from their nesting colonies. Accordingly, it is likely the egrets from the arboretum colony may already share the same foraging habitat as the Road 103 colony. See also response to comment 4. The project does not include a proposal to limit the arboretum colony's available foraging habitat on campus. The Initial Study determined that the availability of potentially suitable nesting habitat ensures that the Project would not result in a local or regional decline in great and snowy egret populations.

12. The draft Initial Study describes the varied habitat types that heron and egret colonies are known to utilize in this region. The wide variety of habitat types indicate that nesting area locations are abundant and that relocation to a new site is possible. As explained in response to comment 5 regarding managed relocation.

13. The proposed project includes no proposed actions to conduct heron or egret management activities outside of the Shields Oak Grove area. See response to comment 4.

14. Social attraction techniques have been used most frequently and demonstrated to be used most successful in limited settings on select species that have specific isolated nesting opportunities. For example, puffins and murres nest on islands and offshore rocks, where alternative nesting opportunities are limited. The heron and egret populations are expected to relocate independently based on factors that would best advantage these colonies for future population success. Given the multitude of factors surrounding nesting site selection, the herons are presumed to have the best judgment for selecting a relocation site. See also response to comment 5.

15. The UC Davis Arboretum has been created as a resource for scientific, education and recreational programs associated with plant collections. These recreational benefits would continue and would be improved by the proposed project. Current restrictions around the Shields Oak Grove area due to concern of diseases carried by the herons and egret have limited recreational, educational and scientific research opportunities. Heron dissuasion is not proposed for any other trees on campus, which has numerous suitable habitat areas (e.g. Putah Creek). It is therefore possible that the colony will be re-established in another campus location. Recreational opportunities for viewing herons and egrets in the region have existed and are expected to continue to exist. Economic factors are not a CEQA consideration. See also response to comment 6 regarding the need to protect Shields Oak Grove as an educational resource. The commenter's proposal to install viewing platforms and interpretative services at Putah Creek Reserve is not within the scope of the proposed project.

16. The commenter presumes that the herons will be extirpated from the campus environs. There is no evidence to reach this conclusion. The birds will not be killed by the proposed action and are expected to relocate to a different nesting area. Egrets and herons routinely fly considerable distances to reach foraging sites during the nesting season (see response to comment 7). Outside the breeding season, the birds are not constrained to nest site locations and will range over even larger areas. The birds that relocate are expected to continue to function as part of the on-going

predator/prey process in the area. Bird surveys conducted in the Arboretum in the 1990s before the colony was established documented that great egrets, snowy egrets, and black-crowned night-herons were routinely present in small numbers throughout the year. A similar survey in 2005 and 2006, after the colony was established, had similar results (A. Engilis, personal communication).

17. West Nile Virus arrived in the Davis area in 2004. The arboretum colony has continued to thrive and increase even with the arrival of this disease increasing from 512 active nests in 2004 to 866 active nests in 2008. The Road 103 colony has continued to thrive since the arrival of West Nile Virus and while no formal surveys are available, the population levels of the Road 103 colony appear to have increased at levels similar to the increases documented for the arboretum colony (A. Engilis, personal communication). In general, herons and egrets experience less mortality from West Nile Virus and are presumed to experience less population stress than other birds such as crows and magpies (W. Boyce, personal communication). Since the herons and egrets routinely fly long distances to reach foraging areas, the nest dissuasion efforts are not expected to greatly increase energetic costs because the birds are predicted to find a new nesting area in the 2009 nesting season. Thus, short term stress on the birds as they are displaced from the colony is not expected to increase mortality. The campus is not aware of other efforts to displace other colonies in Yolo and Solano counties.

18. University actions taken prior to 2009 were in compliance with CEQA and with all applicable environmental laws. Prior activities were determined to be categorically exempt in accordance with the requirements and guidelines for CEQA implementation.

19. See response to comment 1.

References

Boyce, Walter. UC Davis Veterinary Medicine Wildlife Health Center. Phone call March 3, 2009.

Engilis, Andy. UC Davis Department of Wildlife, Fish, and Conservation Biology. Email February 24, 2009.

Crouch, S., C. Paquette, and David Vilas. Relocation of a Large Black-crowned Night Heron Colony in Southern California. Waterbirds 25(4):474-478.

Custer, T. W., and R. G. Osborn. 1978. Feeding habitat use by colonially-breeding herons, egrets, and ibises in North Carolina. Auk 95:733-743.

Yolo Audubon Society Checklist Committee. 2004. Checklist of the Birds of Yolo County, California. Yolo Audubon Society. Revised April 2004. Yolo Audubon Society, Davis, CA.

Matt Dulcich

From: Chad Roberts [rcr@robertsecp.com]
To: UC Davis Environmental Review
Subject: Comment on Initial Study for Shields Grove Colony Project

Greetings,

The Yolo Audubon Society (YAS) has been contacted by Paul Kelly regarding the potential that the University's proposed actions in "relocating" the heron/egret colony in Shields Grove may be associated with significant environmental effects on Great Egrets and possibly on other colonially nesting wading birds. The Board of Directors of the YAS has taken no formal position on the proposed project.

The Board has been briefed on the project in the past and is aware that there are adverse environmental effects for the oaks in the grove as a consequence of the rookery/heronry. Board members are aware that the majority of the birds on the colony are Cattle Egrets, a non-native species that many conservationists believe should not be protected in any way. In addition, the Board's members are aware that the colony also includes an increasing number of Black-crowned Night Herons, which are known to be a significant predator on Tricolored Blackbird colonies, a species that the YAS has identified as a conservation priority in the county and the region. The YAS generally does not support actions that would allow for significant increases in Black-crowned Night Heron populations in Yolo County, although the YAS does not advocate active control for this species.

Nonetheless, the YAS does recognize that Mr. Kelly's comments about the relative scarcity of Great Egret nesting colonies in Yolo County raises a question about potential impacts on this species that should be considered in adequate detail to be sure that effects on this species are adequately mitigated. Mr. Kelly's comments are properly framed in a context of conservation biology, and we hope that the University gives them full consideration. 1.

Thank you,

Chad Roberts
Conservation Chair
Yolo Audubon Society

RESPONSE TO CHAD ROBERTS

The numbered response corresponds to the large bold comment numbering found on the right side of the comment letter.

1. See responses to comments 2 and 7 from commenter Paul Kelly regarding availability of habitat throughout the Sacramento region. Great egret and snowy egret populations are considered common to abundant in Yolo County and are not considered scarce at any time of year (Yolo Audubon Society Checklist Committee 2004). The impact to the heron colony located in UC Davis Shields Oak Grove is described and analyzed in section 6.4.3.d of the Arboretum Heron Colony Management Initial Study. The analysis concludes that the impact to the herons is less than significant because the proposed action: (1) would not kill adults, chicks or eggs; (2) the birds would be able to disperse to other nesting locations; and (3) the habitat features present in Shields Oak Grove are not unique and similar habitats are found in the area. The comment assumes that the birds in the Shields Oak Grove colony will no longer nest in the region when existing evidence indicates that they will relocate to a new nesting area either nearby within Yolo County or Solano County or elsewhere in the Sacramento region. Given the expected relocation, data indicating that great egrets frequently forage 10 miles from their nesting colonies and up to 20 miles under some conditions (McCrimmon et al. 2001, Custer and Osborn 1978), no local ecological consequences are expected. Because the impact is identified as less than significant an environmental impact report is not necessary and no mitigation measures are proposed.