

WILDLIFE HAZARD ASSESSMENT

CHARLES M. SCHULZ-SONOMA COUNTY AIRPORT
SONOMA COUNTY, CALIFORNIA

Submitted to:

Charles M. Schulz-Sonoma County Airport
2200 Airport Boulevard
Santa Rosa, California 95403
(707) 565-7243

Prepared by:

LSA Associates, Inc.
157 Park Place
Point Richmond, California 94801
(510) 236-6810

LSA Project No. MHN530

LSA

October 2007

TABLE OF CONTENTS

| | |
|---|----|
| 1.0 INTRODUCTION | 1 |
| 1.1 SITE LOCATION AND DESCRIPTION | 2 |
| 1.2 HABITATS | 2 |
| 2.0 METHODS | 7 |
| 2.1 DATA SOURCES | 7 |
| 2.2 WILDLIFE SURVEYS | 7 |
| 2.3 REPORT AUTHORS | 10 |
| 3.0 POTENTIALLY HAZARDOUS WILDLIFE | 11 |
| 3.1 MULE DEER (RHS 100) | 11 |
| 3.2 TURKEY VULTURE (RHS 63) | 12 |
| 3.3 CANADA GEESE (RHS 52) | 13 |
| 3.4 OSPREY (RHS 50) | 14 |
| 3.5 AMERICAN WHITE PELICAN (RHS 44) | 14 |
| 3.6 DUCKS (RHS 37) | 15 |
| 3.7 EAGLES (RHS 31) | 16 |
| 3.8 HAWKS (RHS 25) | 16 |
| 3.9 ROCK PIGEON (RHS 24) | 17 |
| 3.10 GULLS (RHS 22) | 18 |
| 3.11 HERONS (RHS 22) | 19 |
| 3.12 COYOTE (RHS 20) | 19 |
| 3.13 MOURNING DOVE (RHS 17) | 20 |
| 3.14 OWLS (RHS 16) | 20 |
| 3.15 AMERICAN KESTREL (RHS 14) | 21 |
| 3.16 SHOREBIRDS (RHS 12) | 21 |
| 3.17 AMERICAN CROW AND COMMON RAVEN (RHS 9) | 22 |
| 3.18 BLACKBIRDS AND EUROPEAN STARLING (RHS 9) | 22 |
| 3.19 SPARROWS (RHS 4) | 22 |
| 3.20 SWALLOWS (RHS 2) | 23 |
| 4.0 WILDLIFE HAZARD MANAGEMENT AREAS | 24 |
| 5.0 REFERENCES | 28 |

APPENDICES

- A: Animal Species (Wildlife) Observed on and Adjacent to the Sonoma County Airport Property
- B: Relative Frequency of Occurrence Maps, Figures B1 through B7
- C: Wildlife Strikes Reported for the Sonoma County Airport 1990 through 2005
- D: Wildlife Assessment Field Data Sheets

FIGURES AND TABLES

FIGURES

| | |
|--|----|
| Figure 1: Regional Location..... | 3 |
| Figure 2: Project Location..... | 4 |
| Figure 3: Habitats and Wildlife Attractants..... | 5 |
| Figure 4: Wildlife Hazard Management Areas..... | 25 |

TABLES

| | |
|---|----|
| Table A: Potentially Hazardous Wildlife - Sonoma County Airport | 8 |
| Table B: Wildlife Hazard Management Areas - Sonoma County Airport | 26 |

1.0 INTRODUCTION

This Wildlife Hazard Management Plan (WHMP) addresses known and potential wildlife hazards to aircraft operations at the Charles M. Schulz-Sonoma County Airport (hereafter referred to as the "Sonoma County Airport" or "Airport") in Sonoma County, California. The Federal Aviation Administration (FAA) Manual of Wildlife Hazard Management at Airports (Cleary and Dolbeer 2000) states that the overall goal of a WHMP is:

"...to minimize wildlife populations on and around an Airport that pose a threat to aviation safety or to structures, equipment and human health."

Under FAA guidelines, preparation of a WHMP should be based, in part, on the information provided by a *Wildlife Hazard Assessment* (WHA), which is considered to be an essential first step in preparation of the overall WHMP. The WHA should be prepared by qualified wildlife biologists and should provide the scientific basis for the development and implementation of a WHMP. Although the WHA can be incorporated into the WHMP, it should also serve as a stand-alone document.

This WHA was prepared in accordance with applicable FAA guidelines as per 14CFR 139.337, and is intended to provide the basis for the later preparation of a WHMP. Pursuant to the guidelines, this WHA provides baseline information as follows:

- Which wildlife species have access to the Airport, based on direct observations, mapped habitat types and/or known occurrences in the Airport vicinity, as per 14CFR 139.337(b)(2).
- Wildlife species' legal status, movement patterns and seasonal patterns is also provided as per 14CFR 139.337(b)(2).
- Natural and non-natural features within and near to the Airport that serve or may serve as wildlife attractants, as per 14CFR 139.337(b)(3).
- Descriptions of the wildlife hazards to air carrier operations, as per 14CFR 139.337(b)(4).
- Prioritized recommendations for mitigating hazardous wildlife attractants, identified under 14CFR 139.337(b)(3).

A separate Biological Assessment (BA) was prepared by LSA wildlife biologists in conjunction with this WHA (LSA 2006). The BA provides detailed information on special status plant and animal species that occur or have the potential to occur in or near the Airport. The BA will facilitate future consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) under Section 7 of the Federal Endangered Species Act and with the California Department of Fish and Game (CDFG) with regard to any wildlife hazard management actions that may be required under the future WHMP.

1.1 SITE LOCATION AND DESCRIPTION

The Sonoma County Airport is located near the northern edge of the Santa Rosa Plain, approximately two miles west of U. S. Highway 101 and two miles southeast of the Russian River, in Sonoma County, California (Figures 1 and 2). The Airport property is bordered on the north by Redwood and Airport Creeks, on the east by North Laughlin Road, to the south by Laughlin Road, and to the west by Slusser and Windsor Roads. Mark West Creek is located just south of the southeastern corner of the Airport (Figure 2).

The Airport is situated within unsectioned lands of the San Miguel Rancho land grant in T8N, R9W, on the Healdsburg, California 7.5 minute series USGS quadrangle. The Airport property is generally flat with an elevation range from approximately 100 to 120 feet above mean sea level and encompasses approximately 1,065 acres.

1.2 HABITATS

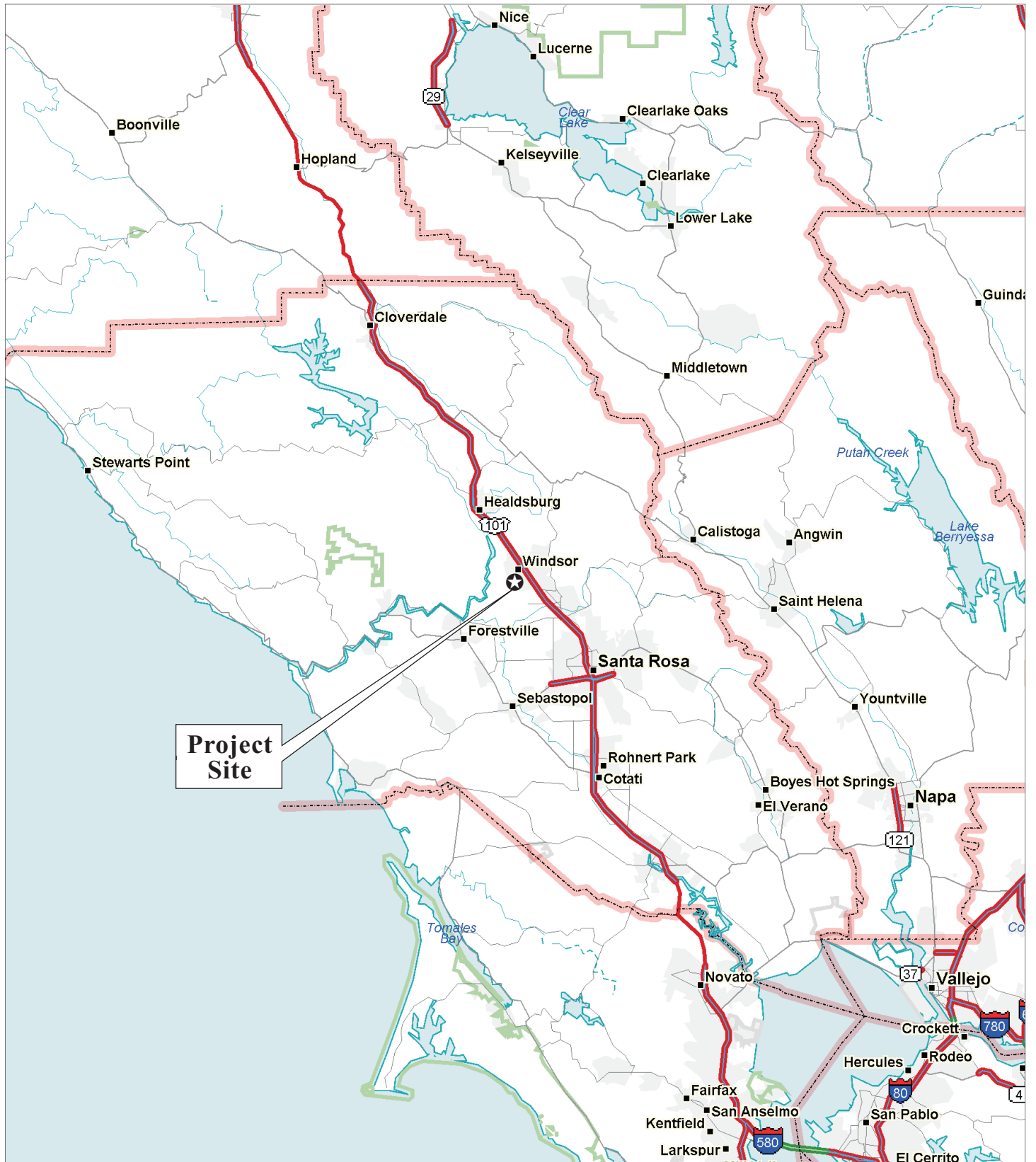
This section provides a brief summary of the habitats that occur at the Sonoma County Airport. More detailed descriptions of these habitats can be found in the Sonoma County Airport BA (LSA 2006).

The Airport property supports a diversity of habitats and land use cover types (Figure 3). The dominant landscape features on the property are the runways and taxiways and associated infields. The eastern portion of the Airport is occupied by various buildings, hangars, parking and storage areas, law enforcement, fire, and search and rescue helicopter facilities. The infield areas are occupied primarily by grasslands dominated by non-native annual grasses, interspersed with native and non-native forbs (broadleaved plants). Much of the grassland on the Airport property is mowed (greenways) and portions of the grassland are irrigated with reclaimed wastewater.

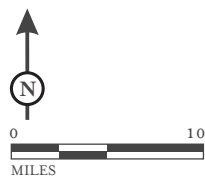
Seasonal wetlands, including vernal pools, are interspersed within the grasslands on the Airport property (Figure 3). Hydrophytic vegetation is present in these wetlands and other seasonally saturated areas, including the irrigated portions of the Airport property (Figure 3). A permanent pond, with associated freshwater marsh and willow thickets, is present in the southeastern corner of the Airport property; this pond is referred to in this assessment as the southeast pond (Figure 3).

Woody vegetation is generally absent on the Airport property with the exception of a few coast live oaks (*Quercus agrifolia*), Fremont's cottonwoods (*Populus fremontii*), red willows (*Salix laevigata*), and coyote-brush (*Baccharis pilularis*) occurring mostly in the southern portion of the infield. Woody riparian vegetation is also present along Mark West Creek, just south of the southeastern portion of the Airport and Laughlin Road and along Airport Creek and associated drainage swales on the northern perimeter of the Airport.

Within the Airport property, riparian woodland is found along Redwood Creek near the northern boundary of the Airport. The creek corridor supports a 40-80 foot wide woody riparian community that continues with few interruptions until its confluence with Windsor Creek. The riparian corridor supports mature valley oak (*Quercus lobata*), Oregon ash (*Fraxinus latifolia*), red willow and Siberian elm (*Ulmus pumila*), a non native species. There is one 400-foot section of the creek at the



LSA

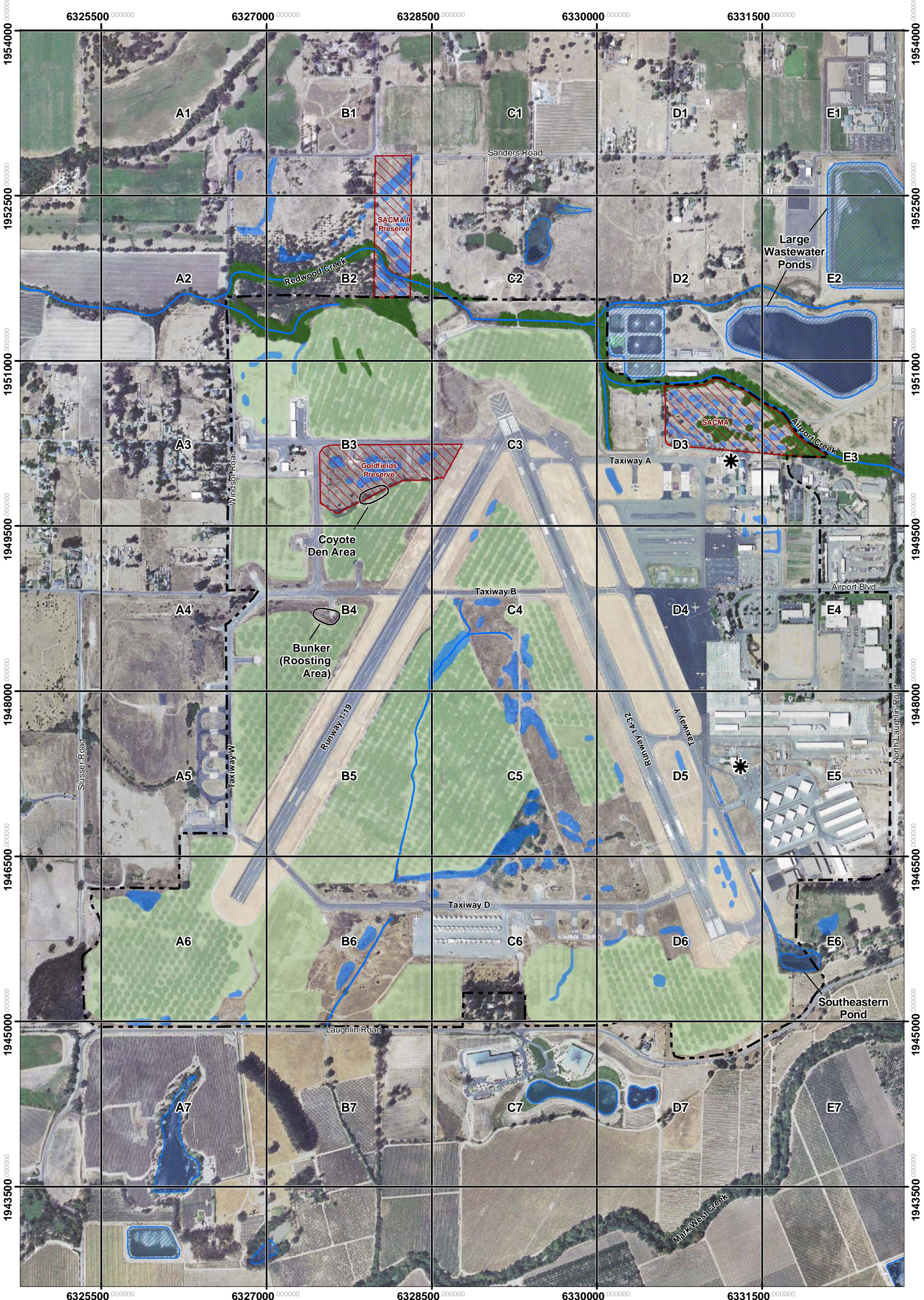


SOURCE: ©2002 DeLORME. STREET ATLAS USA®2003.

P:\MHN530\g\RegionalLocation.cdr (3/23/06)

FIGURE 1

Charles M. Schulz
Sonoma County Airport
Regional Location



LSA



- BOUNDARY OF SURVEY AREA
- * OBSERVATION POINTS
- ▨ PRESERVES

- SITE FEATURES AND HABITATS
- IRRIGATED RUDERAL - CULTIVATED
 - MOWED AREAS
 - RIPARIAN, VALLEY OAKS

- STREAMS AND DITCHES
- SEASONAL WETLANDS
- OPEN WATER
- FRESHWATER MARSH

NOTES: 1) Annual grasslands and ruderal-grasslands occur throughout the undeveloped portions of the airport not covered by one of the vegetation types shown here.
2) Wetland locations and boundaries have not been delineated in accordance with Corps of Engineers methodology.

FIGURE 3

Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Assessment

Habitats and
Wildlife Attractants

north end of Runway 14-32 that is maintained clear of all woody vegetation to meet safety compliance standards for the Airport as required by the FAA. The vegetation in this area is dominated by poison hemlock (*Conium maculatum*) and Harding grass (*Phalaris aquatica*).

The landscape to the west, south, and north of the Airport is largely rural, consisting of pasture land, cropland, vineyards, and rural residential development. There are also several groves of large blue gums (*Eucalyptus globulus*) present south and west of the Airport (Figure 3). The area to the east is occupied primarily by industrial park development and associated landscaping. This area is interspersed with open undeveloped parcels supporting sparse annual grassland. A wastewater treatment facility with associated ponds is located just northeast of the northeast corner of the Airport. The two large ponds within the wastewater treatment facility are referred to in this assessment as the large wastewater ponds (Figure 3).

Other water bodies in the surrounding area are seasonal wetlands, including vernal pools, mitigation sites north of the Airport, golf course ponds north of the Airport, and permanent ponds associated with the vineyards, pastures, and rural residences west and south of the Airport. The mosaic of wooded stream corridors, oak woodland, blue gum groves, permanent and seasonal water bodies, open pasture, and grasslands on and adjacent to the Airport is attractive to a wide variety of wildlife species that pose a potential hazard to aircraft. A complete list of the animal (wildlife) species observed to date by LSA biologists on the Airport property and adjacent areas is provided in Appendix A.

2.0 METHODS

2.1 DATA SOURCES

The primary data for this report, summarized in Table A, were assembled from several sources to help predict where on the Airport potentially hazardous species or species groups are likely to occur. These data sources are listed below:

1. the prior field experience of LSA wildlife biologists with the target species or species groups in Sonoma County (LSA 2003);
2. field surveys conducted by LSA wildlife biologists at the Airport;
3. publications on the birdlife of Sonoma County (Bolander and Parmeter, 2000 and Burridge, 1995); and
4. a search of the California Natural Diversity Database (CNDDDB) to locate records of special-status species known from the area that may pose a hazard to aircraft or may be affected by wildlife hazard management efforts.

2.2 WILDLIFE SURVEYS

LSA wildlife biologists conducted field surveys for the wildlife species or species groups listed in Table A on October 24, November 21, and December 23, 2005; and January 4, 2006. The November and January surveys were conducted from two observation points that offered clear views of wildlife movement on the Airport property (Figure 3). Surveys were conducted for approximately two hours at each observation point. In addition, the wastewater ponds located just northeast of the Airport property, which were not visible from the Airport, were checked on each survey date for geese and ducks.

Data were recorded for all potentially hazardous wildlife species seen on or adjacent to the Airport property (Table A). The location of the wildlife observations were recorded with reference to a numbered grid pattern, developed in a GIS format, and overlaid on an aerial photograph of the Airport (Figure 3). The grid squares are approximately 1,400-feet on a side.

All observations were recorded on field data sheets (see Appendix D). Take offs and landings of aircraft during the surveys were also tallied and recorded on the data sheets. Binoculars (10x40 power) were used to aid in the identification of wildlife.

Table A: Potentially Hazardous Wildlife – Sonoma County Airport

| Animal Species or Group | Relative Hazard Score* | Seasonal Occurrence# | Occurrence and Activity in the Airport Area | Habitat and Food | Principal Attractants at the Airport |
|---|------------------------|----------------------|--|---|---|
| Mule deer | 100 | R | Common resident in the Airport area and occasionally seen on the Airport property. Mule deer would be most likely to occur near runways and taxiways during early morning, evening, and at night. | Bushy areas and woodlands for shelter open and edge habitat for foraging. Feeds on grasses and forbs and browse on the twigs of trees and shrubs. | Dense riparian woodlands along Redwood and Airport Creeks. |
| Turkey vulture | 63 | R | Common resident in the Airport area and frequently seen soaring over the Airport property. Active during the day. | Found in a wide variety of habitat types ranging from open forest to grasslands and farm lands. Feeds on carrion. | Airspace over open areas and runways with thermals for soaring, possible presence of carrion. |
| Geese (Canada goose, cackling goose) | 52 | R | Common resident in the Airport area, expected to occur primarily on grass fields during the winter and spring, or on irrigated short grass, primarily during the day. Local resident population augmented by winter visitors. Active during the day and at night. | Generally associated with wetlands, lakes, ponds, and other water bodies, but frequently forages in upland habitats such as irrigated pastures, flooded fields, golf courses and Airport greenways | Open grassy areas that have been mowed. Also seasonal wetlands. |
| Osprey | 50 | T | Uncommon to rare visitor during migration (but nests along the Russian River just to the north) foraging habitat not present, but could be attracted to waste water treatment pond, likely to occur primarily as a high flying transient during the day. | Occurs near water; seacoasts, bays, harbors, rivers, and other water bodies that support abundant forage fish. Forages over open water for fish and nests in large trees and on power poles and other structures. | None at Airport, but transients flying between the Russian River and other water bodies (such as Laguna de Santa Rosa) are expected to occasionally pass over the Airport. May also be attracted to large pond at wastewater treatment facility |
| American white pelican | 44 | W, T | Uncommon to rare winter visitor during migration, foraging habitat is not present, but could occur at waste water treatment pond, likely to occur primarily as a high flying transient during the day. | Large shallow lakes and other water bodies supporting populations of forage fishes. | None at Airport, but could be attracted to the water bodies at the wastewater treatment facility. |
| Ducks (e.g. mallard, northern shoveler) | 37 | R, S, W, T, | Common permanent residents and winter visitors to wetlands in the Airport area, some species may use short grass areas and seasonal wetlands for foraging and loafing. Active primarily during the day. | Shallow water wetlands, marshes, lakes, and ponds. Dense grassy areas, hayfields, marshes for nesting. | Vernal pools and seasonal wetlands, southeastern pond. Water bodies at the wastewater treatment facility. |
| Eagles (golden eagle) | 31 | R, T | Uncommon resident in Sonoma County, rare transient at the Airport, most likely to occur as high souring single individuals during the day. | Large expanses of remote grasslands, open woodlands, and mountainous country with good populations of prey species (e.g., jackrabbits, ground squirrels). Nests on high cliffs or in tall trees. | Open grassy areas for foraging, |
| Hawks (open country species, e.g. red-tailed hawk, white-tailed kite) | 25 | R | Several species (red-tailed hawk, northern harrier, and white-tailed kite) are resident and common (in low numbers) at the Airport, frequently seen foraging over grasslands, and perched on structures or trees, may nest on the Airport property. Active primarily during the day and at dusk. | Open grassy areas for foraging. The red-tailed hawk and kite nest in trees, harrier nests on the ground in dense stands of grass and open brush. | Open grassy areas for foraging. Trees along Redwood and Airport Creeks for nesting. Small mammal populations as a prey base. |
| Hawks (woodland species, e.g. Cooper's, red-shouldered) | 25 | R | Several species (red-shouldered hawk, Cooper's hawk) are resident in the Airport area, most often seen foraging in wooded area, and perched in trees, may nest on Airport property. Active primarily during the day. | Both species generally forage in woodlands and along woodland edges. Nest in woodlands and isolated stands of trees. | Riparian woodland along Redwood and Airport Creeks for nesting and foraging. Small mammal and other vertebrate populations as a prey base. |
| Rock pigeon | 24 | R | Common nonnative resident on the Airport property, frequently seen flying, perching on buildings, and foraging on the ground during the day. | Occurs in urban, suburban, and rural areas. Roosts in and on buildings, under bridges etc. Generally feeds on the grounds in open areas (fields, vacant lots etc.) for waste grain and seeds. | Airport buildings, open mowed fields, agricultural field north of Airport Blvd. |
| Gulls (ring-billed gull, California gull) | 22 | W, T | Uncommon transients or winter visitors. May occasionally be attracted to seasonal wetlands or other standing water after rains. Active during the day. | Near water bodies, harbors, during winter forages at landfills, along shorelines, in flooded fields. | Flooded infield areas after rain. May also be attracted to large wastewater treatment pond. |
| Hérons (great blue heron, great egret) | 22 | R | Uncommon residents, likely to occur primarily during winter in grasslands and around seasonal wetlands. Active primarily during the day and at dusk. | Forages in wetlands, marshes, and along shorelines, for fish and aquatic invertebrates, during winter often forages in grassy upland areas for rodents. Nest is colonies in secluded groves of trees near wetlands. | Edges of ponds and wetlands, irrigated grasslands, and grassy areas and green ways during winter. Rodent populations in grasslands. |

Table A: Potentially Hazardous Wildlife – Sonoma County Airport

| Animal Species or Group | Relative Hazard Score* | Seasonal Occurrence# | Occurrence and Activity in the Airport Area | Habitat and Food | Principal Attractants at the Airport |
|--|------------------------|----------------------|--|--|---|
| Coyote | 20 | R | Resident (in low numbers) on the Airport property, an active den may be present on the Airport property. Active at all times of the day, but primarily at dusk, dawn, and at night. | Occupies a wide variety of habitats, open woodlands, grasslands, agricultural areas, suburban and urban areas (with some open habitat). Constructs dens in burrows, under buildings, or other excavated sites. Forage on a variety of plants and animal foods | Open relatively undisturbed grasslands and woodlands. Small mammal and other vertebrate populations as a prey base |
| Mourning dove | 17 | R | Resident, likely to nest in woodlands and forage in open areas during the day. | Open woodlands, grasslands, agricultural, rural and suburban areas. Nests in trees and large shrubs. Forages for grain and other seeds on the ground. | Open areas for foraging. Woodlands for nesting. |
| Owls (barn, great horned, burrowing, short-eared owl) | 16 | R, W | The barn owl and great horned owl are resident and likely to nest at the Airport. Both are active primarily at dusk and at night. Both the burrowing and short-eared owls would be expected as uncommon to rare winter visitors or transients. The burrowing owl is often active during the day and the short-eared occasionally so. | Barn owl forages over open grassy habitat, and vacant lots in urban areas, nests in abandoned buildings, tree cavities etc.; great horned owl prefers woodland, but will also forage from a perch (e.g. telephone pole) in open areas, nests in abandoned crow or hawk nests; both the burrowing and short-eared owls forage in open habitats, neither species currently nests in Sonoma County. | Abandoned bunker and open grassy habitats for barn owl; dense riparian woodland, eucalyptus grove, and woodland edge for great horned; open grasslands for burrowing and short-eared owl. |
| American kestrel | 14 | R | Resident at the Airport, but expected to occur in small numbers. Active during the day. | Open habitats, grasslands, agricultural lands, rural landscapes. Nests in abandoned woodpecker holes in utility poles or trees, or other cavities in large trees. | Open grasslands, utility poles. |
| Shorebirds (terrestrial foragers, e.g. killdeer) | 12 | | Resident (e.g., killdeer) at the Airport and are likely to breed in small numbers. Active during the day and at night. | Forage for insects along open wetland edges, short grass fields, and barren ground; nests on bare ground. | Green fields and open barren areas, seasonal wetlands |
| Shorebirds (shallow water foragers, e.g. greater yellowlegs) | 12 | T, W | Most species (e.g., greater yellowlegs, Wilson's snipe) expected in occur in small numbers as winter visitors and/or transients at seasonal wetlands. Active primarily during the day. | Wetlands, shorelines; greater yellowlegs forages in shallow waters and along open shores, snipe forage in grassy wetlands. Neither species breeds in Sonoma County | Vernal pools and seasonal wetlands. |
| Common raven and American crow | 9 | R | Resident foraging in open areas; may nest in wooded areas. Active primarily during the day | Open woodlands, grasslands, agricultural, rural, suburban, and urban areas. Crows nest in tall trees, ravens in tall trees, on cliffs, bridges, etc. Forage in a variety of open habitat for vegetable and animal foods including carrion. | Open short grass areas. |
| Blackbirds (red-winged blackbird, Brewer's blackbird) | 9 | R,W,T | Resident, but numbers expected to increase during winter as local populations are augmented by migrants. May nest (i.e., redwing blackbird) on Airport property in freshwater marsh. Active primarily during the day. | Forage for insects and seeds in open grassland with short (e.g., mowed, grazed) areas and agricultural fields. Redwings nest in marshes and weedy fields, Brewer's in shrubs, | Open short grass areas. |
| European starling | 9 | R | Nonnative resident, likely to breed at the Airport. Active primarily during the day. | Occupies a variety of urban and rural habitat, generally forages on the ground in open habitat (e.g., agricultural fields); nests in cavities in trees and buildings. | Open short grass areas. |
| Sparrows (song sparrow, savannah sparrow) | 4 | R | Resident at the Airport, but numbers expected to increase during winter as local populations are augmented by migrants. Some species likely to nest at the Airport. Active primarily during the day. | Various species inhabit grasslands, weedy fields, and woodland edges, large numbers occur during the winter. Several species expected to nest in weedy areas, freshwater marsh, and along brushy edges. | Grasslands, weedy areas, edges of riparian woodlands. |
| Swallows (barn, cliff, tree, northern rough-winged swallow) | 2 | S, T | Summer visitors and transients during migration, several species may nest at the Airport. Active primarily during the day. | Forage for arthropods in the air column over open habitats, water bodies, and woodland clearings. Expected to nest in Airport buildings (e.g., barn and cliff swallow) or woodland trees (e.g. tree swallow). | Open areas, water bodies, trees in riparian woodland, buildings and bunkers as nest sites. |

* Relative hazard score is based on the sum of percent of strikes by bird species (or group of species) causing damage or effect-on flight scaled downward from 100 (with 100 being the score for the species, or group of species with maximum summed values) as per Cleary and Dolbeer (1999).

Seasonal occurrence codes are: R = year round resident, may breed locally; S = summer resident, may breed locally; W = winter visitor, does not breed locally; T = migrant, or may breed in region, but unlikely to occur at the Airport regularly

Maps showing relative frequency of occurrence of wildlife within the study area were prepared for species or species groups with a Relative Hazard Score (“RHS”) of 20 or greater¹ (Appendix B). The number of observations of a given species or species groups per grid square was summed from data recorded during the field surveys. This number was then divided by the total number of observations of a given species or group of species. In doing so, a number between 0 and 1 was obtained. This number was then ranked into one of three categories: high, medium, or low.

This approach provided a method for comparing relative frequencies of observation of individual species or species groups regardless of the actual number of observations made for a given species. For example, the number of observations of the turkey vulture (*Cathartes aura*) during the field survey was forty-six and the number of observation of the Canada goose (*Branta canadensis*) was eight.

2.3 REPORT AUTHORS

Project Manager

George Molnar, Senior Wetland Ecologist, LSA Associates

Primary Author and Field Observer

Eric Lichtwardt, Senior Wildlife Biologist, LSA Associates

Wildlife Hazard Management Recommendations

Richard Nichols, Senior Biologist, LSA Associates

Additional wildlife observations by LSA Associates staff

Tim Lacy, Wildlife Biologist; Tim Milliken, Botanist, Chip Bouril, Soil Scientist

¹ The Relative Hazard Score (RHS) of species or groups of species is derived from the FAA’s ranking of the potential hazard from birds and other wildlife (Cleary and Dolbeer 2000). The RHS is based on a sum of the percent of strikes by a given species (or group of species) that has caused damage or effect-on flight scaled downward from 100 (100 being the maximum summed value for a given species or group of species).

3.0 POTENTIALLY HAZARDOUS WILDLIFE

Based on LSA's field observations and analyses of the data sources described in Section 2.1, the Sonoma County Airport was found to have several significant wildlife hazards that should be addressed through a long-term WHMP. The most significant hazards are posed by certain species of wildlife that engage in the following behavior patterns:

1. Birds and mammals with high RHS values that forage within or move through the runway, taxiway and associated infield areas of the Airport. Species or species groups of particular concern in this category are mule deer, coyote, Canada goose and ducks.
2. Birds with high RHS values whose flight behavior tend to occur in the airspace within runway takeoff and landing zones. Species or species groups of particular concern in this category are Canada goose, ducks, herons and turkey vulture.
3. Birds with moderate to low RHS values that tend to occur seasonally or year-round in large flocks that may frequently or occasionally intercept the airspace within runway takeoff and landing zones. Species or species groups of particular concern in this category are blackbirds, European starlings, killdeer and gulls.

The following sections discuss the occurrences and recommended management approaches for each of these species or species groups at the Airport. Occurrences of potentially hazardous wildlife species at the Airport are also summarized in Table A. The species or species groups in the table are ranked according to their relative hazard score (RHS) from highest to lowest. Maps showing relative frequency of occurrence of wildlife within the study area were prepared for species or species groups with a Relative Hazard Score ("RHS") of 20 or greater (Appendix B).

3.1 MULE DEER (RHS 100)

Occurrence. Mule deer (*Odocoileus hemionus*) occur in the area around the Airport and are frequently seen within the Airport property (LSA pers. obs.). Mule deer often feed in open areas at dusk and at night and spend the day in heavily vegetated areas. The riparian corridor along Redwood and Airport Creeks is an especially attractive area for mule deer because it provides daytime cover, water, and is adjacent to open areas (Airport) where the deer can forage at night. This area along the southern edge of these creek corridors provides an abundance of edge habitat (e.g., between woodland and grassland) that is favored by mule deer.

Data on the number of mule deer present on the Airport property was not available to LSA while conducting this hazard assessment. However, based on incidental observations by LSA biologists, over several years of working on the Airport property, and in adjacent areas, it is apparent that these large mammals are relatively common in the area.

Management Recommendations. The FAA recommends a zero tolerance for deer at Airports, but keeping deer out of Airports can be difficult. The most effective technique is habitat modification in

combination with a perimeter steel chain-link fence at least 9.8 feet (3 meters) high (Katona et al. 2000). Cattle guards, at least 15 feet (4.6 meters) long, are effective at excluding deer at fence openings that must remain open for vehicle movement. One way gates, located at the corners of the perimeter fence, are effective in allowing deer to exit the areas inside the fence but not return (Katona et al. 2000).

Implementing the deer exclusion measures outlined above would most likely not be feasible at the Airport. The current installation of a six-foot high chain-link fence around the perimeter of the Airport property will most likely exclude most deer, but deer could potentially get over the fence and individuals inside the fence will have to be removed. To increase the effectiveness of the perimeter fence in excluding deer, LSA recommends adding a two-foot high barbed wire extension (angled outward) to the fence. To remain effective the fence will have to be monitored and maintained diligently.

A deer monitoring program should be designed assess the presence of deer within the Airport property. Deer monitoring could include periodic visual surveys, such as spotlighting at night, and searching for deer sign such as tracks and droppings during the day. The monitoring program should also include a strategy to trap and remove any deer found within the perimeter fence. Personnel involved in trapping and relocating deer should have the appropriate permits from the California Department of Fish and Game.

Deer have not been involved in any reported aircraft strikes at the Airport. However, due to their high RHS and known occurrence on the Airport property these large mammals pose a potential hazard to aircraft.

3.2 TURKEY VULTURE (RHS 63)

Occurrence. Turkey vultures are a common resident species in Sonoma County (Bolander and Parmeter 2000) and are frequently seen soaring over the Airport property and surrounding areas (LSA pers. obs.). Turkey vultures feed on carrion which they detect by sight and smell as they soar over the landscape. It is not known if turkey vultures are attracted to the Airport property for any specific reason, such a greater abundance of fresh carrion, but the large area of open habitat with relatively light human activity could be an attractant. Also thermals, used by turkey vultures to facilitate soaring may be more frequent over the open paved runways and short-grass infields.

During the wildlife surveys, turkey vultures were observed soaring over most of the Airport area with high and medium relative frequency of observation in grid squares C5 and B4 respectively, and a low relative frequency of observation in nine other grids. These data suggests that turkey vultures occur commonly over the Airport and occasionally concentrate in selective areas, probably at sites where a large dead animal is present. This conclusion is supported by LSA's general observations of turkey vultures in Sonoma County.

Management Recommendations. It would not be practicable to exclude turkey vultures from the airspace over the Airport because these large wide-ranging birds are common in the area and there are few if any barriers to their movement while soaring. However, their presence can be minimized by actively detecting and promptly removing any dead animals from Airport property or along adjacent roads. This may be the most practicable method for reducing hazards from turkey vultures at the

Airport. A program for carrion removal that concentrates on daily inspections of the infield, taxiways and roadways and especially the Runway Safety Zone, at the north and south ends of the runways is recommended.

3.3 CANADA GEESE (RHS 52)

Occurrence. Canada geese historically occurred as an uncommon winter visitor in Sonoma County. But this adaptable species is now a common permanent resident (Bolander and Parmeter 2000). The numbers of resident Canada geese in the Airport area is not known, but based on LSA's observations they appear to be fairly common and the resident population is likely augmented by the arrival of migrant birds in the fall. The smaller, less common, cackling goose (*Branta hutchinsii*) also occurs in the Airport area as a winter visitor, one was seen at the northern most large wastewater pond on November 23, 2005.

The grid squares that Canada geese were recorded in during the field survey were D2, D3, E2, and E3 with a high relative frequency of occurrence (Appendix B). Canada geese appear to be attracted to these grids because of the presence of open areas of mowed grass for feeding and loafing and the open water of the large waste water ponds. Mowed grass not only provides a favorite food for geese but also allows them to spot potential predators from a distance. The large wastewater ponds provide a relatively secluded area of aquatic habitat for geese. Canada geese are also seen around seasonal wetlands during the winter when these habitats hold water.

Management Recommendations. Canada geese potentially pose one of the most serious wildlife hazards to aviation at the Airport. However, in the past 16 years Canada geese have been involved in only one of the 14 reported aircraft wildlife strike events at the Airport (FAA National Wildlife Strike Database). The wildlife strike event involving the goose occurred at night and resulted in only minor damage to the aircraft (Appendix C).

The presence of Canada geese on the Airport property can be reduced, but not eliminated, by actively managing such attractants as mowed grass and seasonal wetlands. LSA recommends that grass in the mowed areas be allowed to grow taller (6 to 10 inches) than the current mowing height in order to deter geese from foraging and/or loafing in these areas. Alternatively, or in addition to the taller mowing heights, the Airport could plant low growing shrubs or groundcovers in key areas where geese may pose a particular hazard to aircraft. Hazing geese can also be effective in keeping them off of areas near runways. Options for hazing geese are often more effective if they include occasional culling.

Grids of wire or monofilament line can be used to exclude waterfowl from ponds. The Internet Center for Wildlife Damage Management, University of Nebraska, recommends grids of stainless steel spring wire 0.015-to 0.030-inch (0.4-to 0.8-mm) or ultraviolet-protected monofilament line 0.071-inch (1.8-mm). Grids with 10-foot squares are effective in keeping most waterfowl off ponds, but a 5-foot grid pattern may be required to exclude all waterfowl.

Geese generally nest in areas where they can walk to a pond or other water body. Geese cannot walk to the large wastewater ponds from foraging areas on the Airport due to intervening fences. The southeastern pond is accessible by walking from potential nesting sites. Geese could be discouraged

from nesting near this pond by placing a fence along the shoreline. The Internet Center for Wildlife Damage Management recommends a fence of 30-to 36-inch (75-to 90-mm) high poultry wire.

If an active goose nest is found on the Airport property an effective and humane method to ensure that the nest fails is to addle the eggs. The term addling refers to any process which causes a viable egg to not develop. Addling is effective when the eggs are less than 14 days old. Addling stops development of the egg, thus preventing the development of embryos, but does not destroy the egg itself. The adult geese will still attempt to incubate the addled eggs and not lay new eggs, as they often do if the eggs are destroyed or removed from the nest. After the geese have incubated the addled eggs for several weeks, and they fail to hatch, they will abandon the nest and generally will not attempt to nest again that year. Various methods can be used to addle goose eggs including shaking and oiling, but it is essential that the process be conducted by trained personnel familiar with the nest finding, egg ageing techniques, and the nesting habits of Canada geese. It is also important to obtain the proper permits from the United States Fish and Wildlife Service.

Hazing can be an effective technique to keep geese out of specific areas. Various pyrotechnics such as “bangers” and “screamers” fired from a launcher or “cracker shells” discharged from a 12-gauge shotgun can be used. Hazing is often most effective if combined with occasional culling of individual geese. Airport personnel should check with local ordinances and officials before any of these hazing methods are conducted. In addition, appropriate State and federal permits should be obtained by personnel involved in hazing geese or other wildlife at the Airport.

3.4 OSPREY (RHS 50)

Occurrence. The osprey (*Pandion haliaetus*) is a fairly common summer resident in the vicinity and there are a number of breeding pairs along the Russian River (Bolander and Parmeter 2000). The Airport is approximately two miles southeast of the Russian River, but ospreys are not expected to be especially attracted to the Airport. Although no ospreys were observed during the field surveys, migrating or transient ospreys may occasionally be attracted to the large wastewater ponds to the north of the Airport. However, most osprey activity in the area is expected to be concentrated along the Russian River. The osprey is considered a California species of special concern at its nesting sites.

Management Recommendations. Due to their infrequent occurrence at the Airport, ospreys are not expected to pose a significant hazard.

3.5 AMERICAN WHITE PELICAN (RHS 44)

Occurrence. The American white pelican (*Pelecanus erythrorhynchos*) is a common summer and fall visitor to Sonoma County (Bolander and Parmeter 2000). One individual was observed soaring to the north of the Airport during the field survey on October 24, 2005. This large bird is attracted to large shallow water bodies that support good populations of forage fish (e.g., Laguna de Santa Rosa) and this species is not expected to be attracted to the wetlands on the Airport property. American white pelicans may occasionally visit the large wastewater ponds, but are not expected to occur in significant numbers at the Airport. The American white pelican is considered California species of special concern at its nesting colonies. This species does not nest in Sonoma County.

Management Recommendations. Due to their infrequent occurrence at the Airport, white pelicans are not expected to pose a significant hazard.

3.6 DUCKS (RHS 37)

Occurrence. Various species of ducks occur on the water bodies on the Airport property and in surrounding areas. The mallard (*Anas platyrhynchos*) the most common species and is known to use the seasonal wetlands for foraging and loafing (LSA pers. obs). Also, mallards potentially breed in areas adjacent to seasonal wetlands on the Airport property. Though mallards feed primarily in shallow water they will also feed on land in the areas of mowed grass adjacent to the taxiways.

Other duck species observed in the immediate vicinity of the Airport include American wigeon (*Anas americana*), northern shoveler (*Anas clypeata*), green-winged teal (*Anas crecca*), canvasback, (*Aythya valisineria*), lesser scaup (*Aythya affinis*), bufflehead (*Bucephala albeola*) common goldeneye (*Bucephala clangula*), and ruddy duck (*Oxyura jamaicensis*). Most of the observed duck activity on or adjacent to the Airport is concentrated at the southeastern pond and at the large wastewater ponds. Several ponds south of the southwestern corner of the Airport could also be attractive to various species of ducks.

Management Recommendations. Only one wildlife strike involving ducks has occurred at the Airport during the period from 1990 to the present (Appendix C). The strike occurred during the day on February 18, 2000 and involved one bird, but there was no reported damage to the aircraft. The duck species was not reported.

The greatest hazard to aircraft at the Airport from mallards and other ducks would likely be due to birds flushing off of or flying into the southeast pond and/or the large wastewater pond. Most of the seasonal wetlands on the Airport property dry up by early summer and are not an attractant to ducks until they refill during the onset of winter rains in late fall. In a previous assessment of bird use of the seasonal wetland and vernal pools in the Sonoma Airport Consolidated Mitigation Area (SACMA), LSA concluded that these wetlands are not a major attractant to large numbers of ducks (LSA 2003). The seasonal wetlands and vernal pools on the Airport property are similar to those in SACMA and are not expected to be a minor seasonal attractant to ducks. During the field survey ducks (mallards) were recorded in grid D2, D3, E2, and E3 (Appendix B). These ducks were observed feeding on the mowed grass with geese or loafing on the large wastewater ponds.

The large wastewater treatment pond concentrates fairly large mixed species aggregations of ducks during the winter. On November 23, 2005 over 200 ducks of seven species (see above) were present on this pond. Keeping ducks off of the large wastewater pond will likely require a variety of methods used in concert such as wire grids placed over ponds (as described for geese) and culling. The southeastern pond does not appear to support large aggregations of ducks, but this pond is expected to be used by greater numbers of ducks than the wetlands within the Airport property because it is perennial and somewhat secluded by stands of willow and bulrushes. A fence, as described for Canada geese, could be used to discourage ducks from nesting around the southwestern pond.

If nests are found egg addling can be conducted as described for Canada geese. Also, the various hazing techniques described for Canada geese can be effective on ducks.

3.7 EAGLES (RHS 31)

Occurrence. The golden eagle (*Aquila chrysaetos*) is an uncommon resident in Sonoma County (Bolander and Parmeter 2000) and is occasionally observed in the Airport area. The bald eagle (*Haliaeetus leucocephalus*) also occurs in the County, primarily as a rare winter visitor and migrant. Both the golden and bald eagle are fully protected species in California and the golden eagle is considered a California species of special concern at its nesting and wintering sites.

Management Recommendations. Neither of these large raptors is expected to pose a significant hazard at the Airport due to their infrequent occurrence.

3.8 HAWKS (RHS 25)

Occurrence. Several species of hawks and other raptors occur on the Airport property and in adjacent areas. The red-tailed hawk (*Buteo jamaicensis*) is the most common species seen on the Airport property. This large hawk is often observed soaring over the Airport or perched on structures or poles in areas west of Runway 14-32. Based on these observations, it is likely that at least one resident pair of red-tailed hawks occurs on the Airport property and potentially nest on-site.

The red-shouldered hawk (*Buteo lineatus*) is also a common species in the Airport area. This hawk occupies wooded habitats and would be expected primarily in the riparian corridors along Redwood and Airport Creeks and around the grove of blue gum along the southern boundary of the Airport. Red-shouldered hawks potentially nest on the Airport property.

Other species of hawks and other raptors that regularly occur at the Airport include the white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), and Cooper's hawk (*Accipiter cooperii*). In addition, peregrine falcons (*Falco peregrinus*) have been observed hunting over the Airport and around the adjacent wastewater treatment facility. The population of resident hawks in the area is augmented variably from year to year (during the fall and winter) by migrating and wintering individuals of various species. The ferruginous hawk (*Buteo regalis*) is an uncommon winter visitor to Sonoma County that favors open grassland; this species has been observed at the Airport by LSA biologists.

Hawks and other raptors are attracted to the Airport by the presence of small mammals and birds which provide a prey base and the open landscape which is relatively free of human disturbance. Other important attractants are exposed perch sites (e.g., tall trees, utility poles, radar towers etc.). Woodland species are attracted to the mature woodland along the creeks and the woodland edges which provide high quality foraging habitat. The presence of ducks, rock pigeons (*Columba livia*), and other birds attracts peregrine falcons. Isolated groves of tall trees such as blue gum are attractive to red-tailed and red-shouldered hawks as nesting sites.

During the field survey the highest frequency of observation of hawks was in grid C5, with medium frequency in B3 and C4, and low frequency in grids A5, B4, B6, C3, D3, and D5 (Appendix B). The high frequency in grid C5 was due to the presence of a favored perch site of the local red-tailed hawks. Observations within the other grids consisted primarily of northern harriers foraging low over grassland and red-tailed hawks foraging higher in the air. If the field surveys were extended over a greater time interval it is likely that hawks would be observed foraging over all the grids supporting grassland or other low vegetation.

The northern harrier is considered a California species of special concern at its nest sites and the ferruginous hawk is considered a California species of concern on its wintering grounds. The white-tailed kite is a fully protected species in California.

Management Recommendations. Three wildlife strikes involving hawks have occurred at the Airport during the period from 1990 to the present (Appendix C). On September 7, 1997 an unknown species of hawk was involved in a strike that caused only minor damage to the aircraft. A red-tailed hawk was involved in a strike on August 23, 2001, but damage to the aircraft was not recorded. And on December 31, 2000 an unknown species of hawk was involved in a strike that did not cause damage to the aircraft.

It may not be practicable to significantly reduce the use of the Airport property by hawks and other raptors due to the large expanse of attractive habitat present within the Airport property and in surrounding areas. Moreover, the resident pairs of red-tailed hawks may actually be an asset to Airport safety by reducing densities of hawks at the Airport by defending their territories and keeping transient birds away.

Anderson and Osmerk (2005) studied raptor strike avoidance at the Seattle-Tacoma International Airport and found that the raptors most frequently involved in aircraft strikes were juvenile or young birds that were “naïve” about aircraft avoidance. The resident pairs, with territories on Airport lands, were not only adept at aircraft avoidance, but also, being highly territorial during the breeding season, tended to keep juvenile and younger red-tails out of their territories and thus off the Airport. Red-tailed hawks have large discrete territories, a high degree of fidelity to their territories (Janes 1984), and (in Sonoma County) occupy their territories year round. Red-tailed hawks have been documented to live up to 21 years in the wild (Preston and Beane 1993) so a resident pair could potentially provide long term service in keeping local hawk densities relatively low at the Airport. Anderson and Osmerk term such resident pairs at Airports “sentinel hawks.”

The size of the defended territory or home range of red-tailed hawks varies with many environmental factors (*e.g.*, habitat, perch and food availability, human disturbance etc), but the size of the defended area of territories or home ranges is not well documented (Preston and Beane 1993). In Oregon the mean area of 33 territories was approximately 575 acres (Preston and Beane 1993) and in a study of red-tailed hawks in California territories were estimated to be approximately 320 acres (Fitch et al. 1996). Based on this information, resident red-tailed hawk territories at the Airport could cover most if not all of the open (*i.e.*, undeveloped) areas within the Airport property and thus could provide a valuable asset as “sentinel hawks.”

3.9 ROCK PIGEON (RHS 24)

Occurrence. Rock pigeons, a non-native species, are permanent residents at the Airport. Based on our field observations there is a flock of approximately 45 birds that reside in the developed areas in the northeastern portion of the Airport. Rock pigeons forage for various types of seeds on the ground and roost and nest on and in buildings. The primary attractant for pigeons at the Airport is most likely the availability of a secure roost/nest sites in buildings.

During the field surveys, rock pigeons were observed only in grid D3 with a high frequency of occurrence (Appendix B). Rock pigeon activity appears to be focused in this area due to the presence of suitable roosting sites on buildings and foraging areas in the agricultural fields at the Sonoma County Correctional Facility just east of the Airport.

Management Recommendations. Where the Airport pigeons roost/nest is unknown, but if the pigeons can be excluded from these areas (*e.g.*, with bird netting) it would help in making the Airport less attractive to them. Rock pigeons have been observed foraging on the ground in the agricultural fields at the Sonoma County Corrections facility. These fields would probably not be a specific attractant to pigeons if a secure roost/nesting site was not located nearby. On November 23, 2005 a peregrine falcon was observed chasing and catching a pigeon in the air over grid D3. The presence of peregrine falcons around the Airport is probably an important check on the local rock pigeon population.

Pigeons may not currently pose a significant hazard to aviation at the Airport because most of their activity is in areas out of the flight path of aircraft. However, Airport safety would be benefited by efforts to locate and eliminate rock pigeon nesting areas.

3.10 GULLS (RHS 22)

Occurrence. Several species of gulls occur on flooded fields and around wastewater ponds on the Santa Rosa Plain during the winter. The ring-billed gull (*Larus delawarensis*) and California gull (*Larus californicus*) are the typical species in these areas and are expected to occur at the Airport occasionally. However, no gulls were seen during the field surveys when favorable conditions, such as flooded pools, for gulls were present and none were seen at the large wastewater ponds. There are no major gull attractants (such as solid waste landfills, harbors, etc.) in the area around the Airport and gulls do not appear to be especially attracted to any feature at the Airport itself.

The wastewater treatment plant just north east of the Airport is potentially an attractant to gulls, but none were observed there during the field surveys. Gulls are expected to occur at the Airport during wet weather during the winter, but large aggregations of gulls do not appear to frequently occur here.

Management Recommendations. Four strikes involving gulls have been recorded at the Airport during the period from 1990 to the present (Appendix C). The species of gulls involved in these strikes were not recorded. On March 4, 1993 an aircraft struck a single gull, but no damage to the aircraft occurred. On March 4, 1995, during the take-off run, an aircraft was involved in two strikes with gulls resulting in the death of six birds, but no damage to the aircraft occurred. And on October 20, 2000 an aircraft struck several gulls, but whether damage to the aircraft occurred was not reported.

Given the strike record for gulls at the Airport and potential for gulls to aggregate in large flocks that could seasonally concentrate in the infield area, it is recommended that regular long-term observations be conducted to detect potential increases in gull numbers. If such future increases are observed then the hazing techniques described for Canada geese can be effective on gulls. Storing garbage in closed containers and keeping the areas around restaurants and picnic sites free of food waste will also help in making the Airport unattractive to gulls.

3.11 HERONS (RHS 22)

Occurrence. Great blue heron (*Ardea herodias*) and great egret (*Ardea alba*) are fairly common in Sonoma County and typically are associated with wetland habitats that support good populations of fish, frogs, and other small vertebrates. During the winter these large predaceous birds are frequently seen foraging for rodents, such as California voles (*Microtus californicus*), in grassy upland areas, often far from water. Both these herons have been observed at the Airport in uplands areas and around the various water bodies on and adjacent to the Airport property. Both these herons are considered sensitive species with respect to their rookeries (nesting colonies).

The highest frequency of observation of great blue herons and great egrets was in grid C5 (Appendix B). These birds were observed at medium frequency in grids B4 and D3. All these grids support grassy areas where great blue herons and great egrets hunt voles and other small mammals. It is likely that these birds forage throughout the Airport in grassy areas supporting small mammal populations.

The black-crowned night heron (*Nycticorax nycticorax*) is also known to occur at the Airport. This species roosts in dense trees during the day and tends to forage for fish and invertebrates along wetland edges at dusk and during the night and early morning. Black-crowned night herons do not appear to be common at the Airport and suitable foraging habitat is limited to the southern pond, large wastewater pond, and probably the ponds located south of the Airport (Figure 3). Due to the apparently small numbers of black-crowned night herons at the Airport these birds are not expected to pose a significant hazard to aviation.

Management Recommendations. Herons are expected to pose a moderate hazard at the Airport. They occur only in small numbers, however they constitute a potential hazard to aircraft due to their moderate RHS value, combined with their tendency to forage in grasslands and seasonal wetlands in the infield area and take flight when disturbed. The hazing techniques described for Canada geese will make the Airport much less attractive as a foraging area for herons and egrets.

3.12 COYOTE (RHS 20)

Occurrence. Coyotes (*Canus latrans*) are known to occur at Airport (LSA *pers. obs.*) and a recent den site is located on the Airport property in the berm along the southern edge of the goldfields preserve (Figure 3). Coyotes are adept at living in human modified landscapes and often maintain healthy populations in rural residential and urban edge habitats. There is little information available on the population size and habitat use of coyotes at the Airport. However, due to the extent of open habitat and cover (riparian woodland), and the presence of prey species such as black-tailed jackrabbits (*Lepus californicus*) and mule deer, the Airport property is particularly attractive to coyotes.

Management Recommendations. Due to their relatively low numbers coyotes may not pose a significant hazard to aviation at the Airport. Further, the current installation of a six-foot high chain-link fence around the perimeter of the Airport property will provide an effective means for excluding coyotes. Nevertheless, it would be advisable to trap and remove individuals inside the fence. The fence will also have to be monitored and maintained diligently, particularly with respect to new burrows excavated beneath the fence. Coyotes are wary, intelligent, and highly adaptable animals,

they can be hard to trap, and can readily dig under fences or find other means of entering the Airport property.

3.13 MOURNING DOVE (RHS 17)

Occurrence. Mourning doves (*Zenaida macroura*) are a common resident species in Sonoma County, but they do not appear to be attracted specifically to the Airport property. Mourning doves are expected to breed on the Airport property in the riparian woodland and in ornamental trees planted in developed areas. Local numbers are expected to be augmented by winter visitors, but based on LSA's observations there do not appear to be large aggregations of these birds on the Airport property.

Management Recommendations. Mourning doves occur in moderate to low numbers at the Airport and are not expected to pose a significant hazard to aviation.

3.14 OWLS (RHS 16)

Occurrence. Several species of owls occur on the Airport property and in adjacent areas. The barn owl (*Tyto alba*) is a common species in Sonoma County that forages at night by flying low over open habitats in search of small mammals such as voles and pocket gophers. Barn owls typically roost in abandoned buildings, holes in large trees, or in other secluded natural or human created cavities. In Sonoma County, including areas around the Airport, grape growers often place "owl boxes" near vineyards to encourage barn owls to nest, and thus help control rodent populations. A barn owl was observed roosting during the day in the abandoned bunker south of taxiway B and west of runway 1-19 during the one of the field surveys. The open grassland that covers most of the undeveloped areas of the Airport property and surrounding landscape is high quality barn owl habitat and these owls are expected to common locally. Barn owls may pose some risk to aircraft landing or taking off at night, but these owls occur in relatively low densities and most likely do not pose a significant hazard to aviation at the Airport.

The great horned owl (*Bubo virginianus*) is another common owl in Sonoma County. Great horned owls favor open woodlands and edge habitats. They often use old hawk, crow, or raven nests as nest sites, but will also use abandoned buildings, cavities in cliff faces, etc. This fierce predator takes prey up to the size of jack rabbits and skunks, and will also prey on other owls such as the barn owl. These owls are sit-and-wait predators, often sitting for extended periods on a prominent perch as they survey the surrounding landscape for potential prey. Great horned owls are undoubtedly present on the Airport property and are expected to nest in the area, but because they are top level predators they occur in low densities. These large owls are highly sedentary and occupy discrete territories year round. Though unstudied in this regard, resident great horned owls could potentially serve as "sentinels" similar to the resident red-tailed hawks studied by Anderson and Osmerk (2005). The great horned owl is not expected to pose a significant hazard to aviation at the Airport

Burrowing owls favor open often barren habitats with mammal burrows for retreats. Suitable habitat for these small owls is often present around Airports because of the associated abundance of open habitat. These owls typically perch on the ground or on fences posts or other low perches. Burrowing owls are active during the day as well as at night. They were formerly more common in Sonoma County (Bolander and Parmeter 2000), but are now considered rare winter visitors; one was observed

by LSA during January 2003 just west of taxiway Y. This species is too rare at the Airport to be a significant hazard to aircraft.

The short-eared owl (*Asio flammereus*) is a winter visitor to grasslands, weedy fields, and salt marshes in Sonoma County. Short-eared owls typically roost by day on the ground and forage by flying low over the ground in search of small mammals such as voles and pocket gophers. The grasslands on the Airport property appear to provide high quality wintering habitat for this species, but little information is available on the occurrence and abundance of short-eared owls at the Airport.

Both the burrowing owl and short-eared owl are considered California species of special concern at their nesting sites. There are no nesting records of either species near the Airport (Burrige 1995).

Management Recommendations. Barn owls roost in the abandon bunker west of Runway 1-19 (Figure 3), but whether they nest here is unknown. The opening of this bunker could be covered with heavy netting to prevent owls for roosting here, but this would probably not result in a significant decrease in barn owls on the Airport because owls from neighboring areas would still be attracted to the grasslands on the Airport property for foraging. Barn owls in Sonoma County occupy permanent territories and a resident pair of owls on the Airport could potentially provide long term service in helping keeping local barn owl numbers at relatively stable low densities, as described for red-tailed hawks above.

3.15 AMERICAN KESTREL (RHS 14)

Occurrence. The American kestrel (*Falco sparverius*) is a common small raptor in Sonoma County, but it generally occurs in low population densities. The resident population is augmented in the winter by migrants and winter visitors from more northern areas. American kestrels occupy open habitats and nest in holes (e.g., old woodpecker nest holes) in trees or wooden utility poles. They forage for insects, small mammals and birds from a prominent perch or by flying and periodically hovering over open areas. American kestrels likely nest on or adjacent to the Airport, but probably are not a significant aviation hazard because of their relatively low RHS and low densities in the Airport area.

Management Recommendations. Potential nesting sites for American kestrels, such as old woodpecker nest holes in wooden utility poles, should be monitored. If potential nest sites are located near runway safety zones they should be plugged during the non-breeding season (September to January) with an appropriate material such as cement to discourage kestrel nesting.

3.16 SHOREBIRDS (RHS 12)

Occurrence. Several species of shorebirds occur on the Airport property. Killdeer (*Charadrius vociferus*) is a common resident that occurs in barren upland areas, short grass fields, and along open wetland margins. It is likely that small numbers of this species breed on the Airport property. The numbers of killdeer at the Airport increase during the fall and winter; a flock of over 200 were present on in the open area at the south end of runway 1-19 on October 20, 2005. Greater yellowlegs (*Tringa melanoleuca*), and Wilson's snipe (*Gallinago delicata*) occur on the Airport property during winter when the seasonal wetlands and vernal pools are filled. These birds are closely associated with wetland habitats; the snipe favors wet grassy or marshy areas and the yellowlegs forages in shallow

open water. The greater yellowlegs and Wilson's snipe are expected to occur regularly at the Airport but in low numbers; neither species is expected to pose a significant hazard to aviation at the Airport

Management Recommendations. Shore birds generally occur in low numbers at the Airport. However, as noted above large concentrations can occur. Shorebirds should be monitored at the Airport and any large concentrations could be hazed using the techniques described for Canada geese. Culling is not recommended

3.17 AMERICAN CROW AND COMMON RAVEN (RHS 9)

Occurrence. The American crow (*Corvus brachyrhynchos*) is a common bird in the Airport area and is frequently seen flying over or foraging on the ground on Airport property. This species appears to be most frequent adjacent to the riparian corridors along Redwood and Airport Creeks and crows likely nest in the trees in the riparian woodland. The common raven (*Corvus corax*), is also present on the Airport, but occurs less frequently. Both these large birds are highly intelligent and adaptable and local individuals may become adept at aircraft avoidance.

Management Recommendations. Based on their RHS and likely aircraft avoidance, American crows and common ravens are not expected to pose a significant hazard to aviation at the Airport.

3.18 BLACKBIRDS AND EUROPEAN STARLING (RHS 9)

Occurrence. Red-winged (*Agelaius phoeniceus*) and Brewer's blackbirds (*Euphagus cyanocephalus*) occur on the Airport property throughout the year and both species are likely nesters. Red-winged blackbirds nest in freshwater marsh such as around the southeastern pond and in irrigated grassland where the grass is relatively tall. Brewer's blackbirds nest in brushy edge habitat. Both species form large mixed flocks during the non-breeding season and are often joined by European starlings (*Sturnus vulgaris*), a non-native invasive species. Mixed flocks of blackbirds and starlings foraging on mowed lawns or in fields sometime number in the thousands, but large flocks were not observed on the Airport property during the field surveys. Blackbirds and starlings are often attracted to fields that are actively being mowed.

Management Recommendations. The potential for blackbirds and starlings to forage in large flocks in the infield area could pose a potential hazard to aircraft, given the flocks proclivity to engage in unpredictable and abrupt flight behavior. In order to reduce the potential for blackbirds and starlings to forage in the infield grasslands, it is recommended that infield grasses be mowed to a taller height (e.g., 6 - 10 inches). If possible, irrigation of these areas should be reduced or eliminated. A strike involving an American robin (*Turdus migratorius*) occurred at the Airport on November 20, 2002. This species is not closely related to blackbirds or starlings, but American robins are intermediate in mass between red-winged blackbirds and European starlings (Sibley 2000), sometimes form large flocks, and would likely pose a similar hazard to aircraft.

3.19 SPARROWS (RHS 4)

Occurrence. A number of species of sparrows occur on the Airport property including savannah sparrow (*Passerculus sandwichensis*), fox sparrow (*Passerella iliaca*), song sparrow (*Melospiza*

melodia), Lincoln's sparrow (*Melospiza lincolnii*) white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Zonotrichia atricapilla*), dark-eyed junco (*Junco hyemalis*), and others. Song sparrow and dark-eyed juncos are a fairly common nesting species on the Airport property, but sparrows are most common during the winter when many species that only winter in the area are present. Most sparrows favor brushy edge habitat or grassland and in general do not aggregate into large flocks.

Management Recommendations. A flock of sparrows was struck by an aircraft on September 26, 2002. The strike event did not result in any damage to the aircraft. The species involved in this strike is unknown and the birds involved could have been some other small species that superficially resembles a sparrow and has a greater tendency to flock in open habitats, such as the American pipit (*Anthus rubescens*). In spite of the large number of sparrow species that occur on the Airport property these birds generally skulk in low brushy and/or grassy areas, flocks foraging on the ground do not tend to flush high into the air, but dart into nearby cover, and they do not generally fly in large flocks. For these reasons sparrows are not expected to pose a significant threat to aviation.

3.20 SWALLOWS (RHS 2)

Occurrence. Five species of swallows occur on and around the Airport, examples include violet-green swallow (*Tachycineta thalassina*), cliff swallow (*Petrochelidon pyrrhonota*), and barn swallow (*Hirundo rustica*). Swallows forage for flying insects in the air and often occur in loose flocks over water or open fields. Flocks of swallows are often attracted to fields that are being actively mowed, foraging in the air above the fields for insects disturbed by the mowing. Swallows are often observed foraging over large water bodies such as the large wastewater ponds.

These highly migratory birds are generally present in Sonoma County only during the summer, though small numbers of tree (*Tachycineta bicolor*) and violet-green swallows occur sporadically during the winter. Some species such as the cliff swallow can form large nesting colonies, placing their mud nests under bridges, under the eaves of buildings, and in other sheltered places on human made structures. There do not appear to be any large colonies of nesting swallows on or in close proximity to the Airport property.

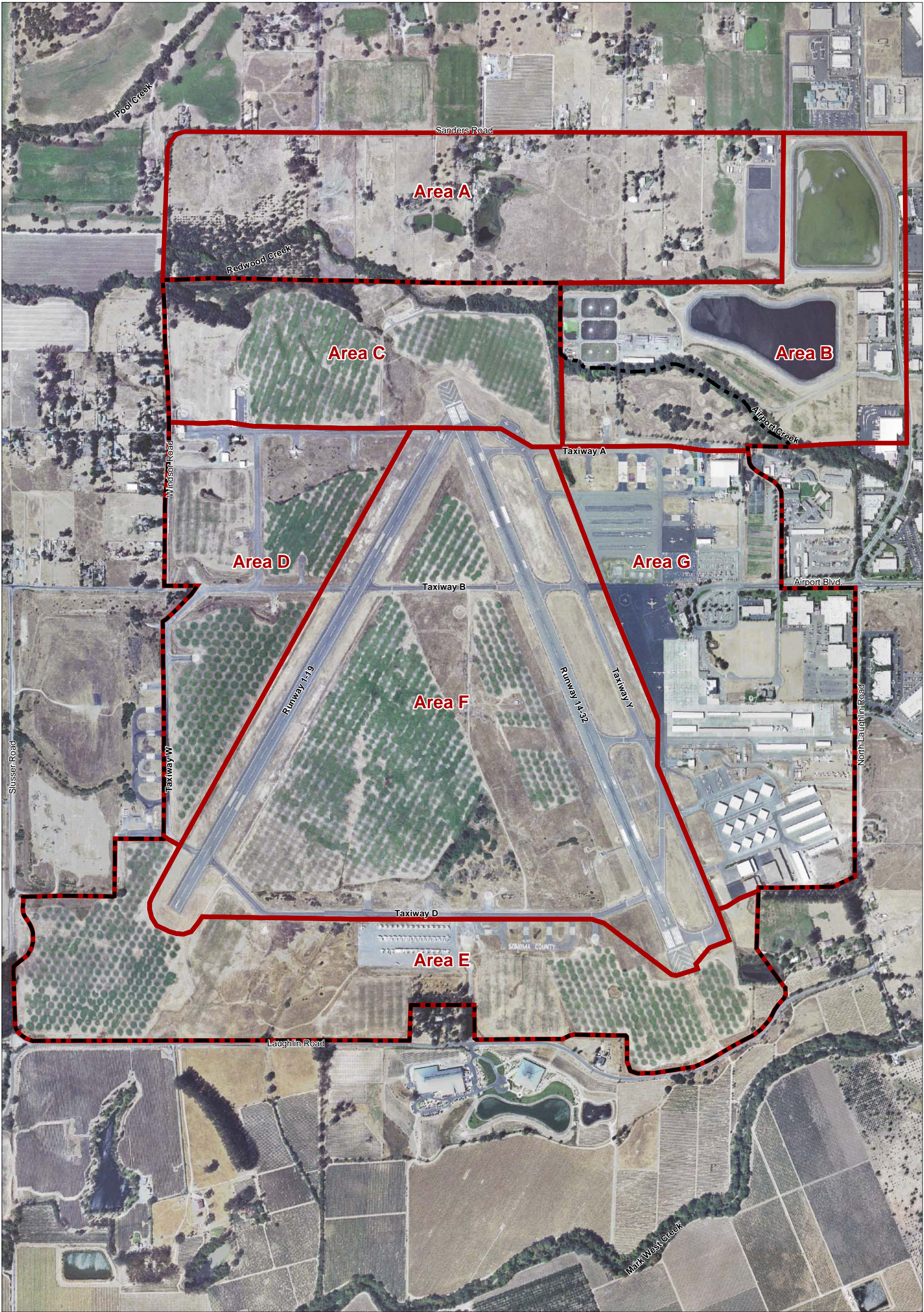
Management Recommendations. Based on the low RHS values of swallows, and the apparent lack of large swallow nesting colonies at the Airport, these birds are not expected to pose a significant threat to aviation at the Airport.

4.0 WILDLIFE HAZARD MANAGEMENT AREAS

In order to facilitate an integrated wildlife hazard management approach for the Sonoma County Airport, this section consolidates the recommended species specific management actions contained in Section 3. Management actions are consolidated based on predominant habitat types within six wildlife hazard management areas within and adjacent to Airport boundaries (Areas A through F - Figure 4). These areas were delineated around areas that had similar land use, ownership, and/or geographic location. The applicable management actions within each area are discussed in Table B.

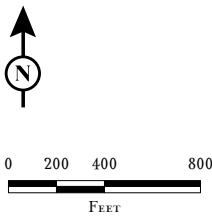
The management areas (Figure 4) are summarized as follows:

- **Area A.** Consisting of the mix of County-owned and private lands located along the Redwood Creek riparian corridor, south of Sanders Road and east of Windsor Road;
- **Area B.** Consisting of the wastewater treatment facility and ponds, and the SACMA wetland mitigation area to the northeast of Taxiway A;
- **Area C.** Consisting of the grasslands and riparian corridor to the north of the two runways;
- **Area D.** Consisting of the grasslands, seasonal wetlands and Airport facilities lying west of Runway 1-19;
- **Area E.** Consisting of marsh habitat, wetlands, grasslands and aircraft parking areas south Taxiway D;
- **Area F.** Consisting of the grasslands and seasonal wetlands in the infield area between Taxiway Y and Runway 1-19; and
- **Area G.** Consisting of the largely developed portions of the Airport east of Taxiway Y.



L S A

FIGURE 4



- PROJECT AREA
- WILDLIFE HAZARD MANAGEMENT AREAS

Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Management

Wildlife Hazard
Management Areas

Table B: Wildlife Hazard Management Areas - Sonoma County Airport

| | Area A | Area B | Area C | Area D | Area E | Area F | Area G |
|---|---|---|--|---|---|--|-----------------------------|
| | Primary Wildlife Hazards | | | | | | |
| | Deer, turkey vulture, Canada geese, ducks | Deer, Canada geese, ducks, turkey vulture | Deer, turkey vulture, Canada geese, ducks, blackbirds, starlings | Deer, turkey vulture, coyote, blackbirds, starlings | Deer, turkey vulture, Canada geese, coyote, blackbirds, starlings | Deer, turkey vulture, Canada geese, ducks, coyote, blackbirds, starlings | Rock pigeon, turkey vulture |
| Recommended Management Actions | | | | | | | |
| <ul style="list-style-type: none"> Regularly inspect and repair perimeter fences; remove burrows beneath fences regularly. | ● | ● | ● | ● | ● | | |
| <ul style="list-style-type: none"> Conduct regular inspections of roadways and open areas for carrion. Remove carrion promptly | ● | ● | ● | ● | ● | ● | ● |
| <ul style="list-style-type: none"> Allow grasses to grow (6 to 10 inches) during the wet season to reduce foraging habitat. | ● | | ● | ● | ● | ● | |
| <ul style="list-style-type: none"> Construct wire grids over waste water ponds to reduce use by waterfowl. | | ● | | | | | |
| <ul style="list-style-type: none"> Mow grasses during the dry season to reduce small mammal habitat. | ● | | ● | ● | ● | ● | |

Table B: Wildlife Hazard Management Areas - Sonoma County Airport

| | Area A | Area B | Area C | Area D | Area E | Area F | Area G |
|---|---|---|--|---|---|--|-----------------------------|
| | Primary Wildlife Hazards | | | | | | |
| | Deer, turkey vulture, Canada geese, ducks | Deer, Canada geese, ducks, turkey vulture | Deer, turkey vulture, Canada geese, ducks, blackbirds, starlings | Deer, turkey vulture, coyote, blackbirds, starlings | Deer, turkey vulture, Canada geese, coyote, blackbirds, starlings | Deer, turkey vulture, Canada geese, ducks, coyote, blackbirds, starlings | Rock pigeon, turkey vulture |
| Recommended Management Actions | | | | | | | |
| • Reduce or eliminate irrigation. | | | ● | ● | ● | ● | |
| • Trap and remove existing coyote. Fill-in existing den burrows during the non breeding season and monitor to ensure that new dens are not dug. | | | | ● | ● | | |
| • Cover the opening to the old bunker with netting to discourage use by owls or other roosting birds. | | | | ● | | | |
| • Construct fence (three feet high) around southeastern pond to discourage nesting by geese and ducks. | | | | | ● | | |
| • Identify nesting areas in buildings and exclude birds from nesting areas by netting. | | | | | | | ● |

5.0 REFERENCES

- American Ornithologists' Union. 1998. *Check-list of North American Birds*, seventh ed. Washington, D. C. American Ornithologists' Union.
- Anderson, C. and S. Osmek. 2005. Raptor Strike Avoidance at Seattle-Tacoma International Airport: A Biological Approach. Presentation abstract, 2005 Bird Strike Committee meeting, Vancouver, British Colombia, Canada.
- Baker, R. J., L. C. Bradley, R. D. Bradley, J. W. Dragoo, M. D. Engstrom, R. S. Hoffmann, C. A. Jones, F. Reid, D. W. Rice, C. Jones. 2003. Revised Checklist of North American Mammals North of Mexico, 2003. Occas. Papers Mus., Texas Tech Univ., 229.
- Beidleman, L. H., and E. N. Kozloff. 2003. *Plants of the San Francisco Bay Region* (Revised Edition). California Press, Berkeley, California
- Bolander, G. L. and B. D. Parmeter. 2000 (revised and updated). *Birds of Sonoma County: An Annotated Checklist and Birding Gazetteer*. Redwood Region Ornithological Society. Napa, California.
- Burridge, B. B. ed. 1995. *Sonoma County Breeding Bird Atlas: detailed maps and accounts of our nesting birds*. Madrone Audubon Society. Santa Rosa, California.
- California Department of Fish and Game (CDFG). 2005. Special Animals. Department of Fish and Game, Wildlife and Habitat Data Analysis Branch, California Natural Diversity Database. Sacramento, California.
- Cleary, E. C. and R. A. Dolbeer. 2000. Wildlife Hazard Management at Airports. A manual for Airport personnel. Prepared jointly by the FAA and the U.S. Department of Agriculture. 253 pp.
- Crother, B. 2000. Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, With Comments Regarding Confidence In Our Understanding. Society for the Study of Amphibians and Reptiles. Herpetological Circular No. 29.
- Crother, B., J. Bounty, J.A. Campbell, K. De Quieroz, D. Frost, D.M. Green, R. Highton, J.B.Iverson, R.W. McDiarmid, P.A. Meylan, T.W. Reeder, M.E. Seidel, J.W. Sites, Jr., S.G. Tilley, and D.B. Wake. 2003. Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico: Update. Herpetological Review, 34 (3).
- Dolbeer, R. A., S. E. Wright, and E. C. Cleary. 2000. Ranking the Hazard Level of Wildlife Species to Aviation. Wildlife Society Bulletin 28: 372-378.

- Fitch, H. S., F. Swenson, and D. F. Tillotson. 1946. Behavior and Food Habitats of the Red-tailed Hawk. *Condor* 48: 205-256.
- Hickman, J. (ed.). 1993. *The Jepson Manual: Higher Plants of California*. University of California Press. Berkeley, California.
- Janes, S. W. 1984. Fidelity to Breeding Territory in a Population of Red-tailed Hawks. *Condor* 86: 200-203.
- Katona, G.Z., R.A. Davis, and G.F. Searing. 2000. Evaluation of the Efficacy of Various Deer Exclusion Devices and Deterrents Techniques for Use at Airports. Aerodrome Safety Branch Transport Canada. Ottawa, Ontario, Canada.
- LSA Associates, Inc. 2003. Bird Use Study: Proposed Sonoma County Airport Consolidated Mitigation Area-Phase 3 (SACAMA-3). LSA Associates, Inc., Pt. Richmond, CA.
- LSA Associates, Inc. 2006. Charles M. Schulz Sonoma County Airport Biological Assessment, Sonoma County, California. LSA Associates, Inc., Pt. Richmond, CA. 33pp + Appends.
- Nelson, et al. (eds.) 2004. *A List of Common and Scientific Names of Fishes from the United States, Canada, and Mexico*. 6th edition. American Fisheries Society Special Publication 20.
- Preston, C.R. and R.D. Beane. 1993. Red-tailed Hawk (*Buteo jamaicensis*). In *The Birds of North America*, No 52 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologist's Union.
- Sibley, A.D. 2000. *The Sibley Guide to Birds*. Alfred A. Knopf. New York.

APPENDIX A

**ANIMAL (WILDLIFE) SPECIES OBSERVED ON AND ADJACENT TO
THE SONOMA COUNTY AIRPORT PROPERTY**

ANIMAL SPECIES OBSERVED ON AND ADJACENT TO THE SONOMA COUNTY AIRPORT PROPERTY

LSA biologists have observed the following species of vertebrates on or adjacent to the Sonoma County Airport Property study area. The list is based multiple site visits conducted in 2003 through 2006.

| COMMON NAME | SCIENTIFIC NAME | SEASONAL OCCURRENCE/NESTING CODES ¹ |
|-------------------------------|----------------------------------|--|
| FISH | | |
| Threespine Stickleback | <i>Gasterosteus aculeatus</i> | R |
| AMPHIBIANS | | |
| Pacific treefrog | <i>Pseudacris regilla</i> | R |
| California slender salamander | <i>Batrachoseps attenuatus</i> | R |
| REPTILES | | |
| Western fence lizard | <i>Sceloporus occidentalis</i> | R |
| Southern alligator lizard | <i>Elgaria multicarinata</i> | R |
| Racer | <i>Coluber constrictor</i> | R |
| Gopher snake | <i>Pituophis catenifer</i> | R |
| BIRDS | | |
| Canada goose | <i>Branta canadensis</i> | R/W |
| Cackling goose | <i>Branta hutchinsii</i> | W |
| Mallard | <i>Anas platyrhynchos</i> | R |
| American wigeon | <i>Anas americana</i> | W |
| Northern shoveler | <i>Anas clypeata</i> | W |
| Green-winged teal | <i>Anas crecca</i> | W |
| Canvasback | <i>Aythya valisineria</i> | W |
| Lesser scaup | <i>Aythya affinis</i> | W |
| Bufflehead | <i>Bucephala albeola</i> | W |
| Common goldeneye | <i>Bucephala clangula</i> | W |
| Ruddy duck | <i>Oxyura jamaicensis</i> | W |
| California quail | <i>Callipepla californica</i> | R |
| Pied-billed grebe | <i>Podilymbus podiceps</i> | R, W |
| American white pelican | <i>Pelecanus erythrorhynchos</i> | W |
| Great blue heron | <i>Ardea herodias</i> | R |
| Great egret | <i>Ardea alba</i> | R |
| Black-crowned night heron | <i>Nycticorax nycticorax</i> | R |
| Turkey vulture | <i>Cathartes aura</i> | R |
| White-tailed kite | <i>Elanus leucurus</i> | R |
| Northern harrier | <i>Circus cyaneus</i> | R/W |
| Cooper's hawk | <i>Accipiter cooperii</i> | R |
| Red-shouldered hawk | <i>Buteo lineatus</i> | R |
| Red-tailed hawk | <i>Buteo jamaicensis</i> | R |
| Ferruginous hawk | <i>Buteo regalis</i> | W |

ANIMAL SPECIES OBSERVED ON AND ADJACENT TO THE SONOMA COUNTY AIRPORT PROPERTY

| COMMON NAME | SCIENTIFIC NAME | SEASONAL OCCURRENCE/NESTING CODES ¹ |
|-------------------------|----------------------------------|--|
| Golden Eagle | <i>Aquila chrysaetos</i> | R |
| American kestrel | <i>Falco sparverius</i> | R |
| Peregrine falcon | <i>Falco peregrinus</i> | R/W |
| American coot | <i>Fulica americana</i> | T |
| Killdeer | <i>Charadrius vociferous</i> | R |
| Greater yellowlegs | <i>Tringa melanoleuca</i> | W/T |
| Wilson's snipe | <i>Gallinago delicata</i> | W/T |
| Rock Pigeon* | <i>Columba livia</i> | R |
| Mourning dove | <i>Zenaida macroura</i> | R |
| Barn owl | <i>Tyto alba</i> | R |
| Burrowing owl | <i>Athene cunicularia</i> | T |
| Anna's hummingbird | <i>Calypte anna</i> | R |
| Acorn woodpecker | <i>Melanerpes formicivorus</i> | R |
| Nuttall's woodpecker | <i>Picoides nuttallii</i> | R |
| Northern flicker | <i>Colaptes auratus</i> | R |
| Black phoebe | <i>Sayornis nigricans</i> | R |
| Say's phoebe | <i>Sayornis saya</i> | W |
| Western kingbird | <i>Tyrannus verticalis</i> | S |
| Western scrub jay | <i>Aphelocoma californica</i> | R |
| American crow | <i>Corvus brachyrhynchos</i> | R |
| Common raven | <i>Corvus corax</i> | R |
| Violet-green swallow | <i>Tachycineta thalassina</i> | S |
| Cliff swallow | <i>Petrochelidon pyrrhonota</i> | S |
| Barn Swallow | <i>Hirundo rustica</i> | S |
| Oak titmouse | <i>Baeolophus inornatus</i> | R |
| Bushtit | <i>Psaltiriparus minimus</i> | R |
| White-breasted nuthatch | <i>Sitta carolinensis</i> | R |
| Bewick's wren | <i>Thryomanes bewickii</i> | R |
| Ruby-crowned kinglet | <i>Regulus calendula</i> | W |
| Western bluebird | <i>Sialia mexicana</i> | R |
| American robin | <i>Turdus migratorius</i> | RW |
| Northern mockingbird | <i>Mimus polyglottos</i> | R |
| Yellow-rumped warbler | <i>Dendroica coronata</i> | T/W |
| Wrentit | <i>Chamaea fasciata</i> | R |
| European starling* | <i>Sturnus vulgaris</i> | R |
| American pipit | <i>Anthus rubescens</i> | T/W |
| Cedar waxwing | <i>Bombycilla cedrorum</i> | T/W |
| Spotted towhee | <i>Pipilo maculatus</i> | R |
| California towhee | <i>Pipilo crissalis</i> | R |
| Savannah sparrow | <i>Passerculus sandwichensis</i> | W |
| Fox sparrow | <i>Passerella iliaca</i> | W |
| Song sparrow | <i>Melospiza melodia</i> | RW |
| Lincoln's sparrow | <i>Melospiza lincolnii</i> | T/W |

ANIMAL SPECIES OBSERVED ON AND ADJACENT TO THE SONOMA COUNTY AIRPORT PROPERTY

| COMMON NAME | SCIENTIFIC NAME | SEASONAL OCCURRENCE/NESTING CODES ¹ |
|-------------------------|--------------------------------|--|
| White-crowned sparrow | <i>Zonotrichia leucophrys</i> | W |
| Golden-crowned sparrow | <i>Zonotrichia atricapilla</i> | W |
| Dark-eyed junco | <i>Junco hyemalis</i> | R |
| Red-winged blackbird | <i>Agelaius phoeniceus</i> | SW |
| Western meadowlark | <i>Sturnella neglecta</i> | RW |
| Brewer's blackbird | <i>Euphagus cyanocephalus</i> | R |
| Bullock's oriole | <i>Icterus bullockii</i> | S |
| House finch | <i>Carpodacus mexicanus</i> | R |
| Lesser goldfinch | <i>Carduelis psaltrias</i> | R |
| American goldfinch | <i>Carduelis tristis</i> | RT |
| | | |
| MAMMALS | | |
| Black-tailed jackrabbit | <i>Lepus californicus</i> | R |
| Botta's pocket gopher | <i>Thomomys bottae</i> | R |
| California vole | <i>Microtus californicus</i> | R |
| Raccoon | <i>Procyon lotor</i> | R |
| Coyote | <i>Canis latrans</i> | R |
| Mule deer | <i>Odocoileus hemionus</i> | R |

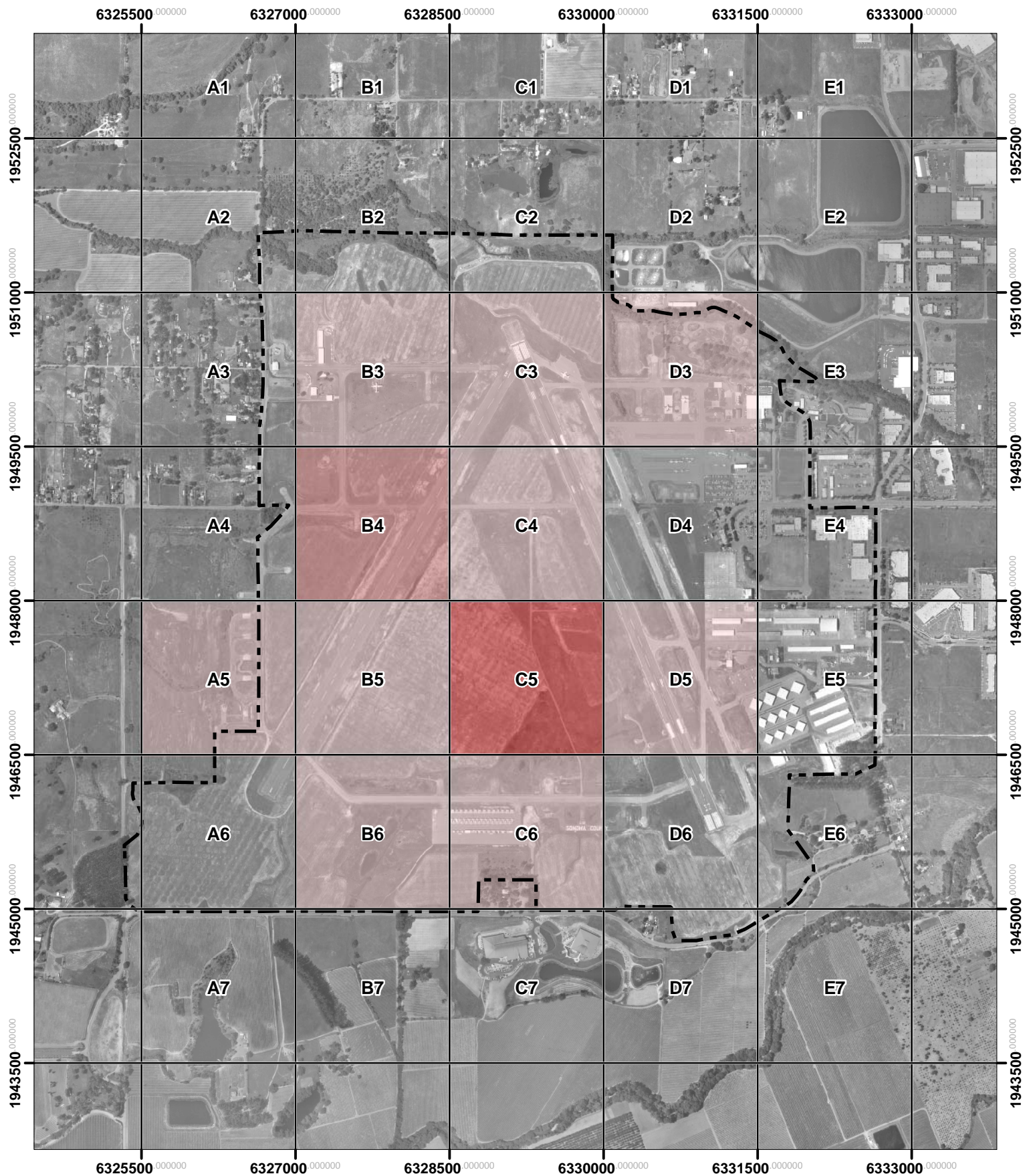
¹ The codes refer to the species presumed seasonal occurrence on the site and probable breeding/nesting status (breeding was not confirmed in most cases).

- M = Migrant: Uses the site for brief periods of time, primarily during the spring and fall months.
- R = Year-round resident: resident/expected to nest/breed on-site or in the vicinity.
- S = Spring/summer resident: May nest on-site or in the vicinity.
- T = Transient: May use the site regularly but unlikely to nest on-site.
- W = Winter visitor: Regularly present during winter; does not nest locally.
- * = Non-native species.

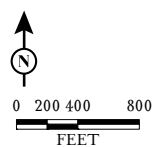
APPENDIX B

FIGURES B1 THROUGH B7

The following figures (B1 through B7) summarize the observations of the Airport field surveys and the observations at the large waste water ponds conducted on November 23, December 21, 2005, and January 4, 2006.



LSA



— BOUNDARY OF SURVEY AREA

RELATIVE FREQUENCY OF OBSERVATIONS

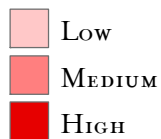
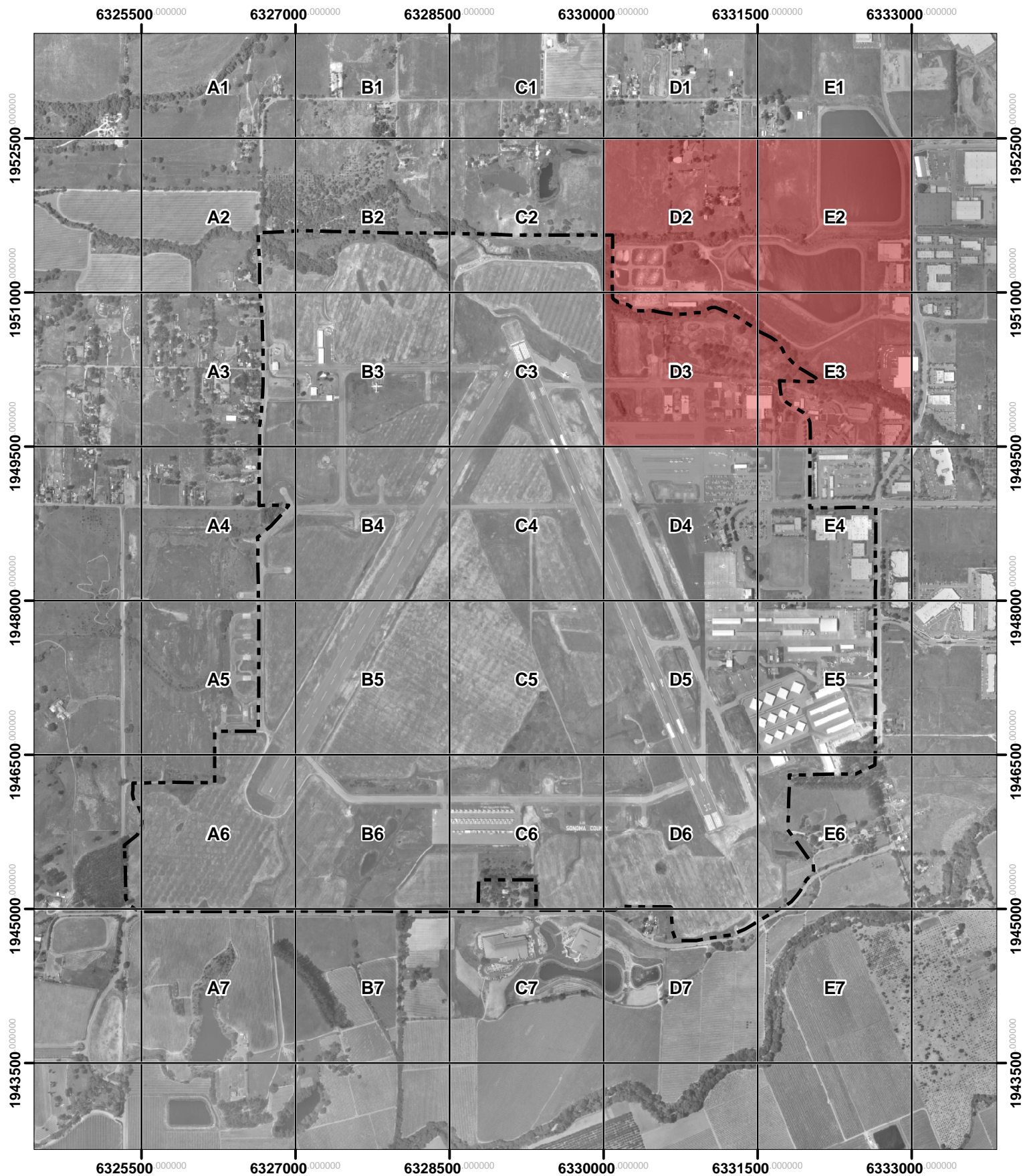


FIGURE 1

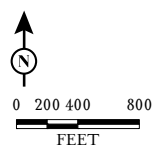
Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Assessment
Turkey Vulture

Source: Aerial Imagery from Sonoma County (2003)

I:\MHN530\GIS\Maps\Wildlife Hazards\Appendix A\Figure1_TurkeyVulture.mxd (04/17/2006)



LSA

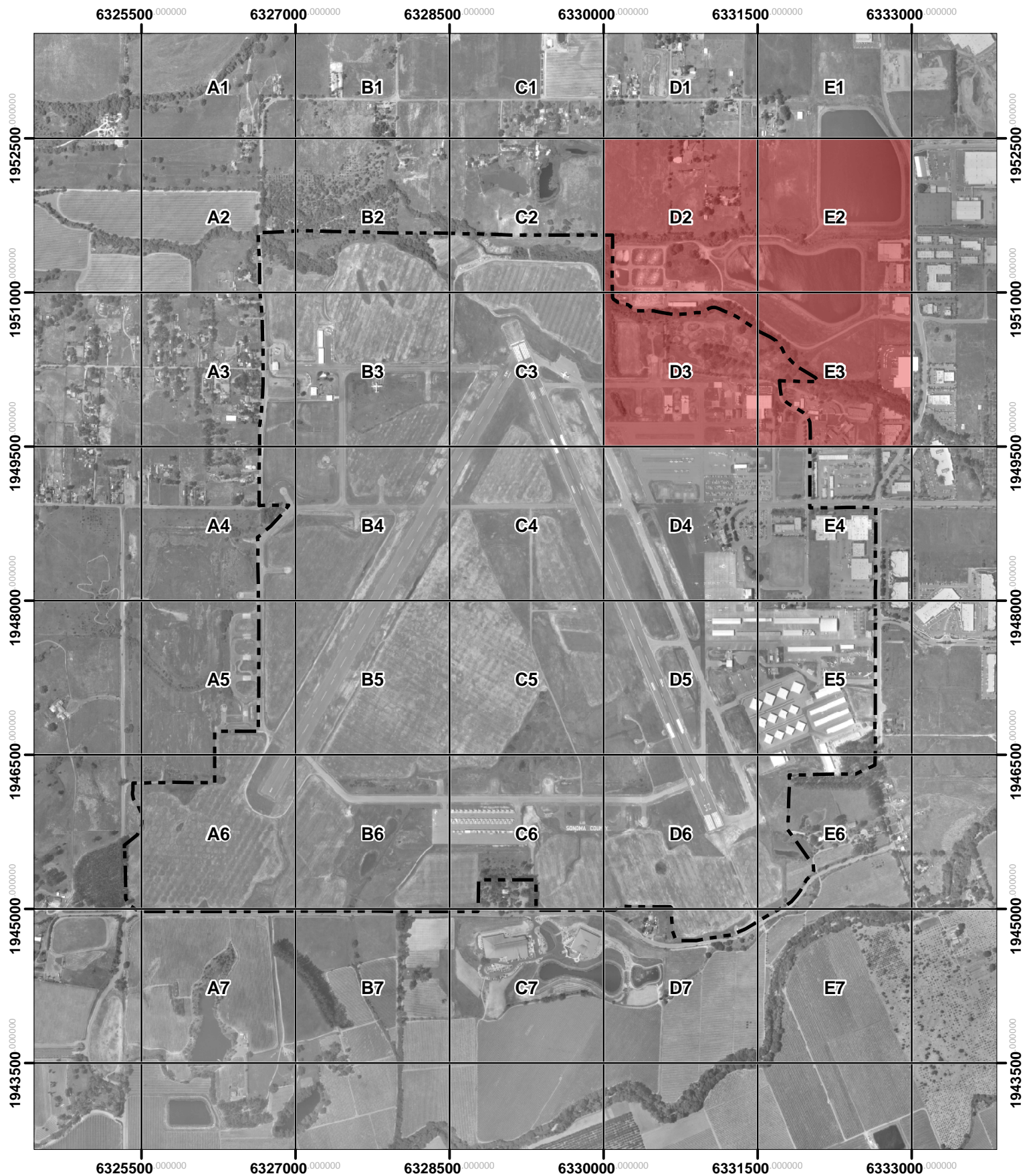


— BOUNDARY OF SURVEY AREA
RELATIVE FREQUENCY OF OBSERVATIONS
■ HIGH

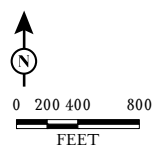
FIGURE 2

Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Assessment

Canada Goose



L S A

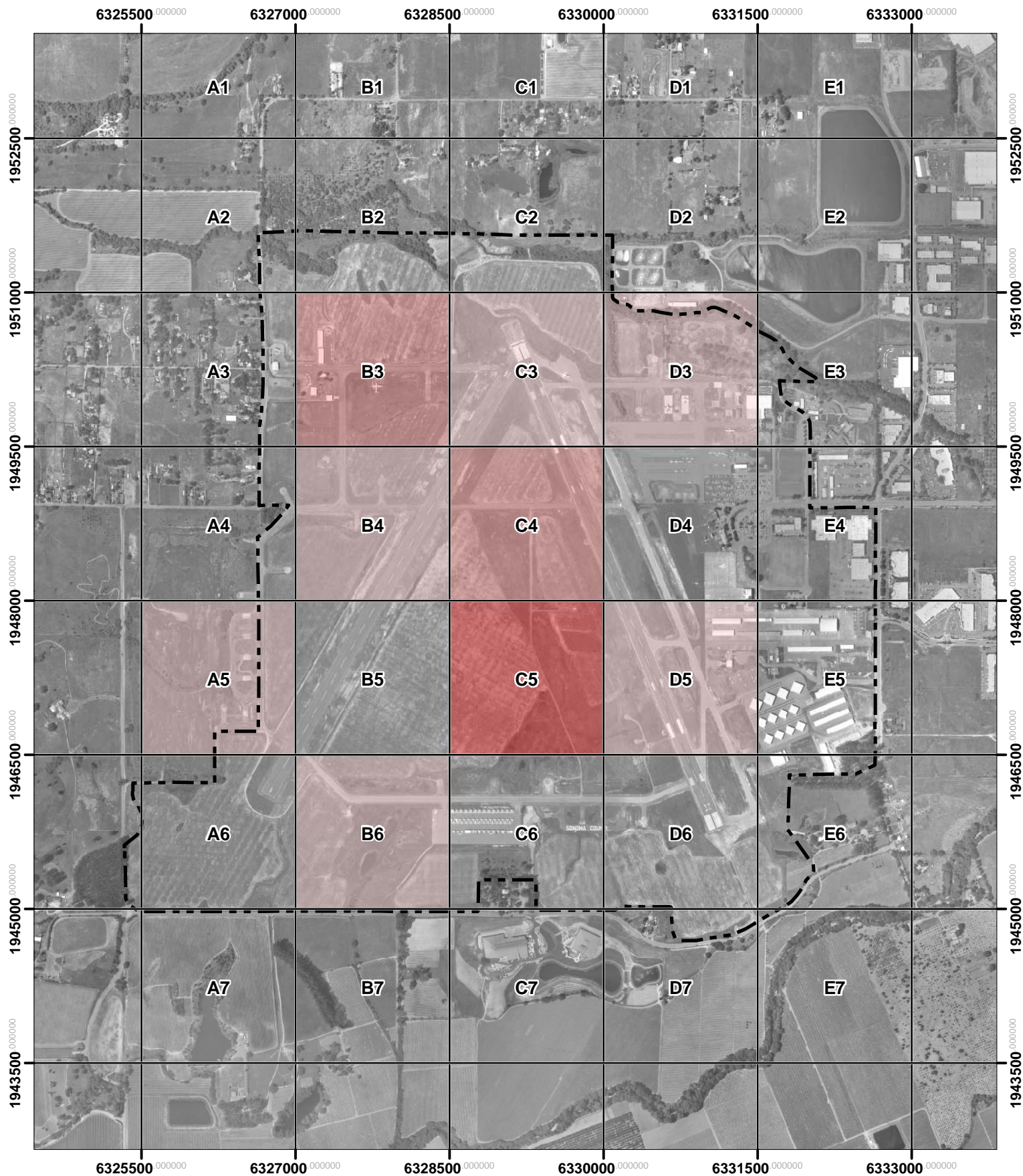


— BOUNDARY OF SURVEY AREA
 RELATIVE FREQUENCY OF OBSERVATIONS
 ■ HIGH

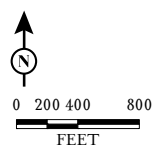
FIGURE 3

Charles M. Schulz
 Sonoma County Airport
 Wildlife Hazard Assessment

Ducks



LSA



— BOUNDARY OF SURVEY AREA

RELATIVE FREQUENCY OF OBSERVATIONS

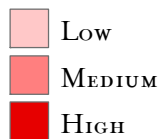
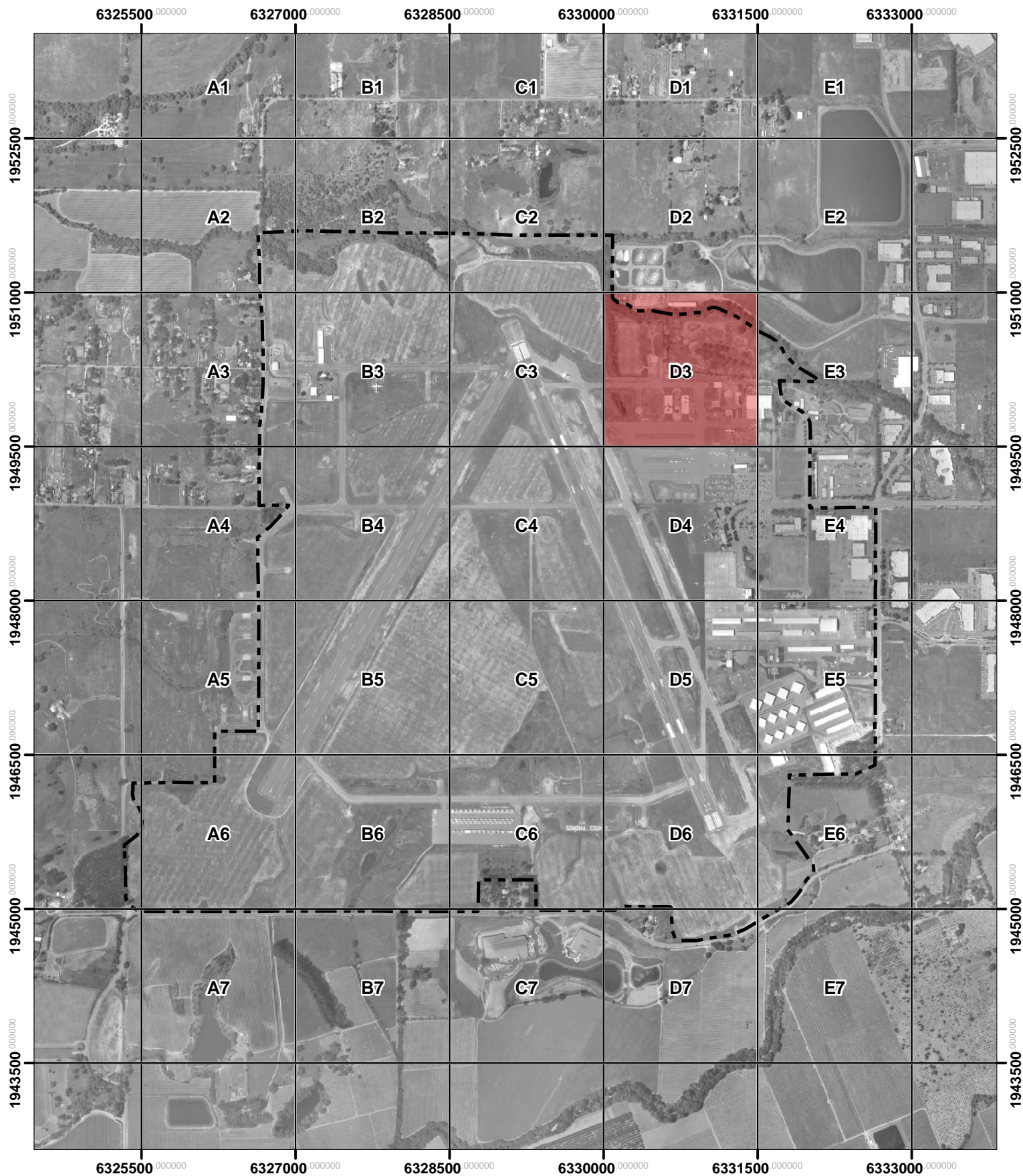


FIGURE 4

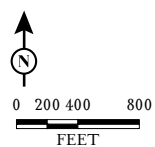
Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Assessment
Hawks and Kites

Source: Aerial Imagery from Sonoma County (2003)

I:\MHN530\GIS\Maps\Wildlife Hazards\Appendix A\Figure4_Hawks&Kites.mxd (04/17/2006)



L S A

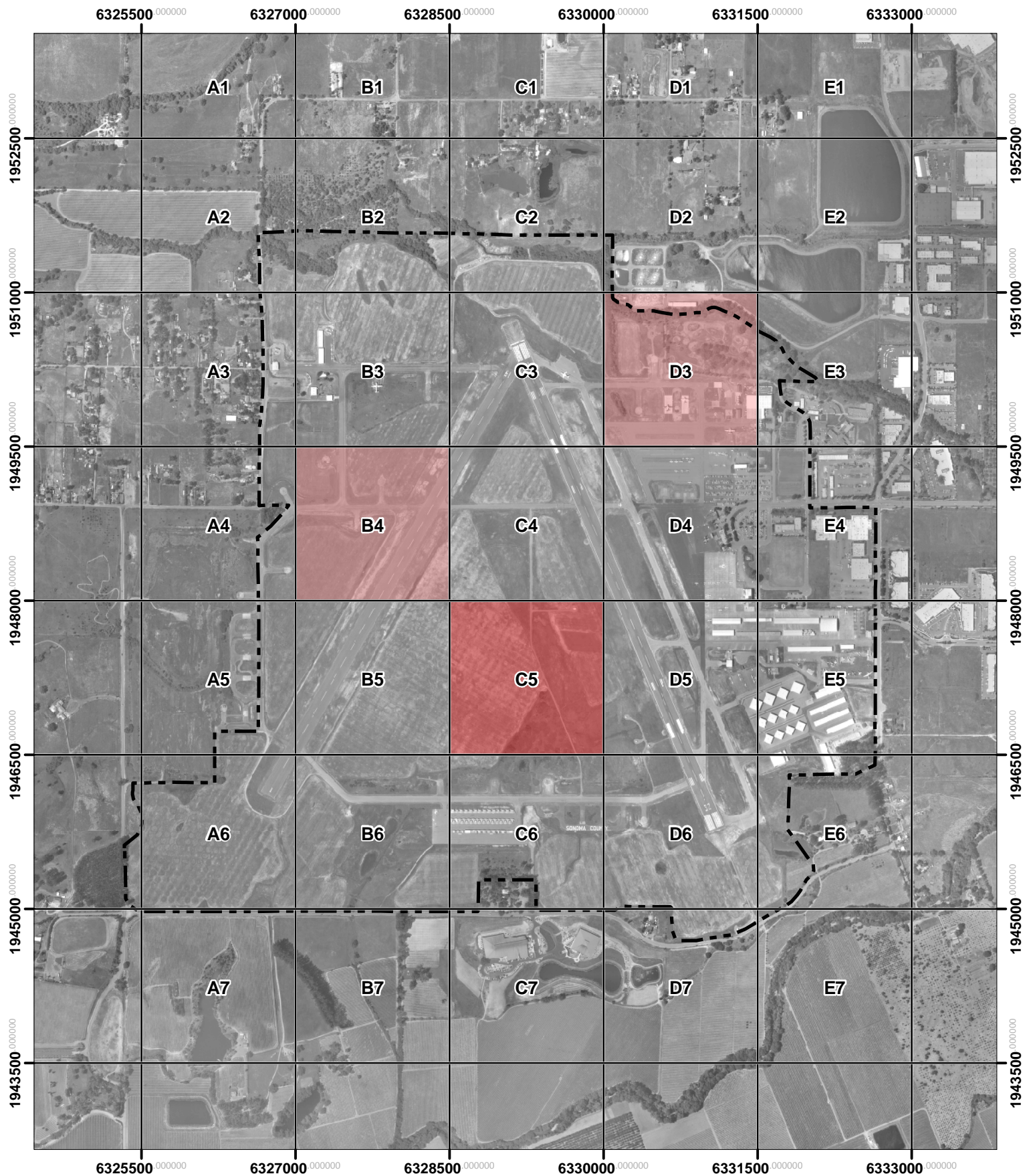


— BOUNDARY OF SURVEY AREA
RELATIVE FREQUENCY OF OBSERVATIONS
■ HIGH

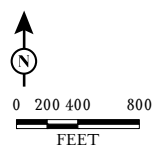
FIGURE 5

Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Assessment

Rock Pigeon



LSA



— BOUNDARY OF SURVEY AREA

RELATIVE FREQUENCY OF OBSERVATIONS



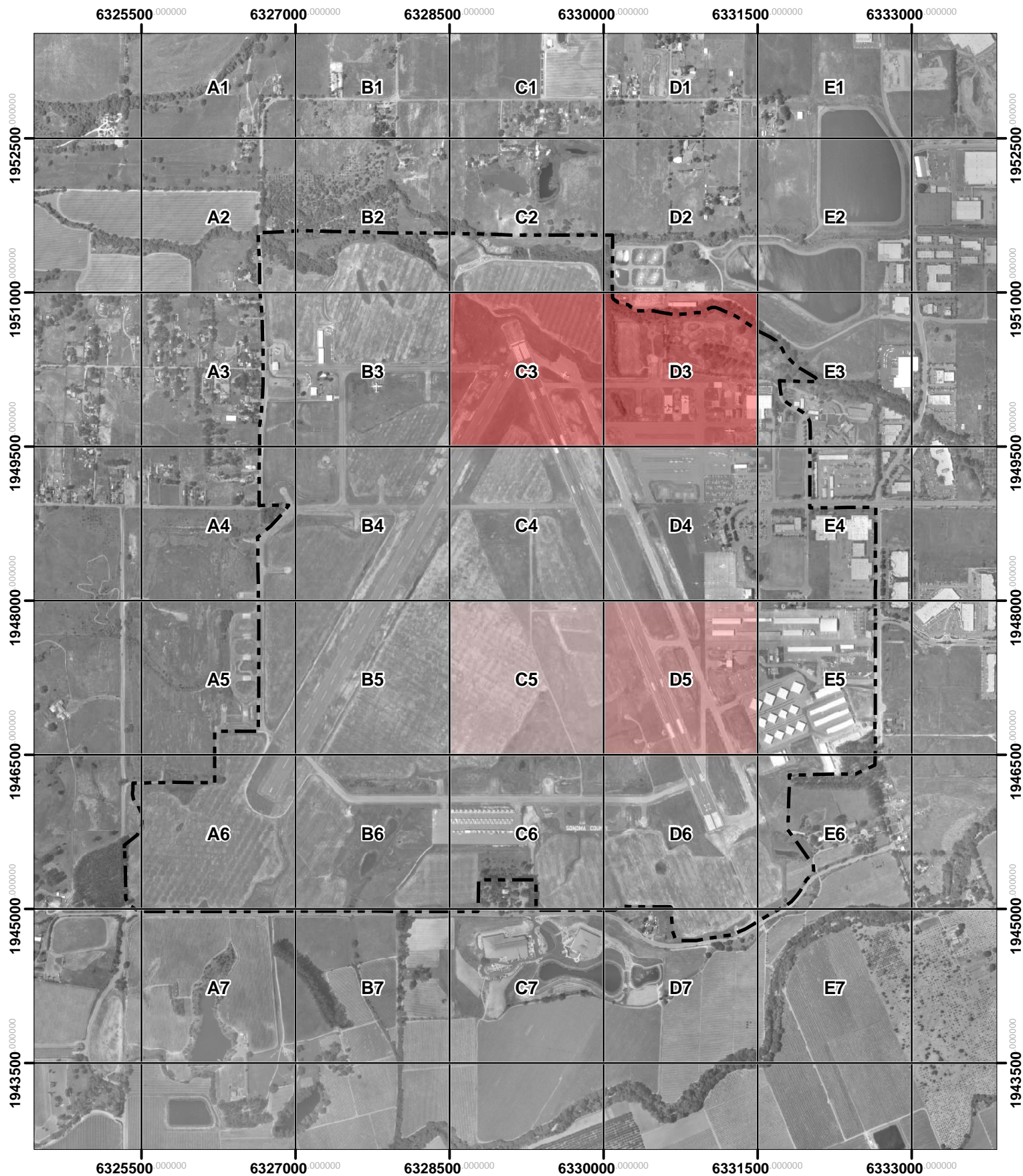
FIGURE 6

Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Assessment

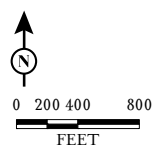
Great Blue Heron and
Great Egret

Source: Aerial Imagery from Sonoma County (2003)

I:\MHN530\GIS\Maps\Wildlife Hazards\Appendix A\Figure6_Heron&Egret.mxd (04/17/2006)



LSA



— BOUNDARY OF SURVEY AREA

RELATIVE FREQUENCY OF OBSERVATIONS

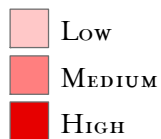


FIGURE 7

Charles M. Schulz
Sonoma County Airport
Wildlife Hazard Assessment

American Crow\Common Raven

Source: Aerial Imagery from Sonoma County (2003)

I:\MHN530\GIS\Maps\Wildlife Hazards\Appendix A\Figure7_Crow&Raven.mxd (04/17/2006)

APPENDIX C

WILDLIFE STRIKES REPORTED FOR SONOMA COUNTY AIRPORT 1990-2005

WILDLIFE STRIKES REPORTED FOR SONOMA COUNTY AIRPORT 1990-2005

[illegible]

APPENDIX D

WILDLIFE ASSESSMENT FIELD DATA SHEETS

Wildlife Assessment - Sonoma County Airport

Date: 01/09/06

Start time: 1230

Cloud cover (%): 0-10%

Observers:

End time: 1430

Temp (F): 65°F

Eric Lichtwardt

Observation

Wind (Beaufort): 0-1

Station: 2

Wind (Direction): variable

Aircraft activity during survey period (tally of takeoffs/landings) ~~1111~~ ¹¹¹¹ ~~1111~~ ¹¹¹¹ : ~~1111~~ ¹¹¹¹

| Species | Time | Grid | Number of Individuals | Behavior/Activity |
|-------------------|------|------|-----------------------|--|
| Turkey Vulture | 1233 | C5 | 1 | soaring (<100') |
| Red-tailed Hawk | 1235 | C4 | 1 | perched on old radio building |
| Turkey Vulture | 1238 | B6 | 2 | soaring (<100') |
| Red-tailed Hawk | 1238 | B6 | 1 | " " |
| Turkey Vulture | 1240 | A5 | 4 | Soaring about 100' |
| Turkey Vulture | 1247 | C5 | 5 | Soaring about 100' & above |
| Turkey Vulture | 1251 | C5 | 4 | Soaring; 4 the same as 1247 |
| N. Harrier | 1255 | C5 | 2 | foraging, low >10' |
| Turkey Vulture | 1255 | C5 | 6-8 | soaring and (2) landing at a possible feeding site at least 2 same as 1247 |
| Turkey Vulture | 1305 | D5 | 1 | Soaring >100' |
| Am. Kestrel | 1309 | D5 | 1 | perched on runway light tower |
| White-tailed Kite | 1320 | C5 | 1 | perched in willow |
| Red-tailed Hawk | 1321 | D5 | 2 | soaring - courtship display <100' |
| Am. Crow | 1324 | C3 | 9 | walking at edge of runway |
| Red-tailed Hawk | 1332 | C4 | 1 | perched on old radio building |
| Turkey Vulture | 1343 | B5 | 2 | soaring about 100' |
| White-tailed Kite | 1405 | C5 | 1 | perched in willow |
| Turkey Vulture | 1409 | C3 | 1 | soaring <100' |
| Red-tailed Hawk | 1447 | C4 | | soaring <100' |

Incidental Observations and Notes:

Wildlife Assessment - Sonoma County Airport

Sheet 2 of 2

Date: 12/21/05
 Observers: Eric Lichtwardt

Start time: 0930
 End time: 1130
 Observation
 Station: 1

Cloud cover (%): 100
 Temp (F): 60-
 Wind (Beaufort): 0-1
 Wind (Direction): -

Aircraft activity during survey period (tally of takeoffs/landings) 111 / 1

| Species | Time | Grid | Number of Individuals | Behavior/Activity |
|-----------------|------|------|-----------------------|----------------------------------|
| Am. Crow | 1020 | D3 | 1 | perched on tank next to runway |
| Am. Crow | 1020 | D3 | 1 | foraging on green way near geese |
| Mallard | 1030 | C3 | 4 | sitting at edge of runway |
| Red-tailed Hawk | 1035 | C4 | 1 | perched on "radio" building |
| Am. Crow | 1100 | D3 | 1 | foraging with geese same as 1020 |
| Canada Goose | 1100 | D3 | 8 | same as 0930 |
| Am. Crow | 1115 | D3 | 3 | landing on seaplane |
| Gull sp. | 1120 | D3 | 1 | flying south |
| Am. Crow | 1125 | D3 | 2 | flying low >10' |
| Am. Crow | 1125 | D3 | 2 | foraging on green way |
| Canada Goose | 1130 | D3 | 3 | flushing and flying to the SW |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Incidental Observations and Notes:

Wildlife Assessment - Sonoma County Airport *sheet 1 of 2*Date: *12/21/05*Start time: *0930*Cloud cover (%): *100%*

Observers:

End time:

Temp (F): *60-**Eric Lichwardt*

Observation

Wind (Beaufort): *0-1*Station: *1130*

Wind (Direction):

Aircraft activity during survey period (tally of takeoffs/landings) */// /*

| Species | Time | Grid | Number of Individuals | Behavior/Activity |
|-----------------------|------|-------|-----------------------|---|
| Canada Goose | 0930 | D3 | 8 | feeding on grass in greenway |
| Am. Crow | 0933 | D3 | 6 | flying over |
| Mourning Dove | 0935 | C3 | 2 | flying |
| White-tailed Kite | 0935 | D3-C3 | 1 | flying west |
| Am. Crow | 0940 | D3-C3 | 2 | perch on light pole |
| White-tailed Kite | 0940 | B3 | 1 | foraging (hovering) |
| Am. Crow | 0945 | D3 | 1 | flying south |
| Am. Crow | 0945 | D3 | 1 | flying north |
| Am. Crow | 0945 | C3 | 1 | flying west |
| Am. Crow | 0950 | D3 | 2 | foraging on green way |
| Red-tailed Hawk | 0950 | C4 | 1 | one leaving perch on radar building and flying west (low > 20') |
| White-tailed Kite | 0955 | B3 | 1 | foraging over grassy area |
| Western Bluebird | 1000 | D3 | 3 | landing on runway |
| Yellow-rumped Warbler | 1000 | D3 | 2 | foraging in greenway |
| Canada Goose | 1005 | D3 | 8 | individuals from 0930 still foraging |
| Western Bluebird | 1010 | C3 | 3 | still foraging near runway |
| Yellow-rumped Warbler | 1010 | C3 | 2 | " " " " |
| Am. Pipit | 1015 | D3 | 1 | foraging near runway |
| Am. Crow | 1015 | D3 | 1 | flying low-landing on greenway |

Incidental Observations and Notes: *Rain during the night and morning, runways wet with some standing water (0935)**Small jet taxiing past Canada Geese did not appear to disturb them**Misting and showers during entire survey period scattered*

Cloud cover (%): 100

Temp (F): 60-

Wind (Beaufort): 0-1

Wind (Direction): variable

Aircraft activity during survey period (talley of takeoffs/landings)

[illegible]**Incidental Observations and Notes:**

Difficult observation condition due to rain & being restricted to vehicle.

Wind (Direction): *Variably*

Incidental Observations and Notes:

Wildlife Assessment - Sonoma County Airport Sheet 1 of 2

Date: 11/23/05 Start time: 1345 Cloud cover (%): 0
 Observers: End time: 1445 Temp (F): 70°F
 Eric Lichtwardt Observation Wind (Beaufort): 0-1
 Station: 2 Wind (Direction): variable

Aircraft activity during survey period (tally of takeoffs/landings) ~~111~~ ~~111~~ : ~~111~~ /

| Species | Time | Grid | Number of Individuals | Behavior/Activity |
|----------------------------|------|------|-----------------------|---|
| Turkey Vulture (TUVU) | 1350 | C6 | 3 | Souring |
| White-tailed Kite (WTKI) | 1355 | B3 | 1 | foraging > 100' |
| Common Raven (CORA) | 1355 | C5 | 1 | flying |
| Common Raven | 1400 | D5 | 1 | flying - souring |
| Turkey Vulture | 1400 | D5 | 1 | souring |
| N. Harrier (NOHA) | 1405 | A5 | 1 | foraging low (>10') flushing mourning Dove |
| Mourning Dove (MODO) | 1405 | A5 | 20 | flushed by N. Harrier |
| Turkey Vulture | 1405 | D5 | 1 | souring |
| White-tailed Kite | 1410 | C5 | 1 | perched on willow |
| Turkey Vulture | 1410 | C5 | 1 | souring |
| Red-shouldered Hawk (RSHA) | 1410 | C5 | 1 | perched in willow |
| W. Meadowlark (WEME) | 1410 | C5 | 1 | landing in infield |
| Common Raven | 1410 | A5 | 1 | flying low (>10') |
| Great Egret (GREG) | 1415 | C5 | 2 | flying over runway (>10') - landing on runway |
| Turkey Vulture | 1420 | C5 | 2 | souring |
| Red-tailed Hawk (RTHA) | 1420 | C5 | 1 | souring |
| Turkey Vulture | 1425 | C5 | 4 | souring 2 of the four are the same as above |
| A. Kestrel (AMKE) | 1425 | B4 | 1 | perched on wind sock |
| Great Egret | 1430 | B4 | 1 | perched on ground next to runway |

Incidental Observations and Notes:

Cloud cover (%): 0

Temp (F): 65-70°F

Wind (Beaufort): 0 -

Wind (Direction): —

Aircraft activity during survey period (tally of takeoffs/landings) ~~17~~ 11 : ~~17~~ ~~17~~ ~~17~~

Incidental Observations and Notes:

Cloud cover (%): 0
Temp (F): 65
Wind (Beaufort): 0
Wind (Direction): —

Aircraft activity during survey period (talley of takeoffs/landings) *1111* *:* *11*

[illegible]**Incidental Observations and Notes:**

Wildlife Assessment - Sonoma County Airport

Date: 01/04/06 Start time: 10:20 Cloud cover (%): 0 - 75% - 0
 Observers: Eric Lichwardt End time: 1220 Temp (F): 65
 Observation Station: 1 Wind (Beaufort): 0-1
 Wind (Direction):

Aircraft activity during survey period (tally of takeoffs/landings) ||||| / |||||

| Species | Time | Grid | Number of Individuals | Behavior/Activity |
|-----------------------|------|------|-----------------------|------------------------------------|
| Am. Crow | 1030 | D3 | 2 | Foraging on green field |
| Am. Crow | 1040 | D3 | 1 | flushed by passing jet |
| Turkey Vulture | 1043 | C4 | 1 | soaring |
| Red-tailed Hawk | 1045 | B3 | 2 | soaring |
| Am. Crow | 1045 | D3 | 1 | landing in green field |
| Say's Phoebe | 1050 | D3 | 1 | perched on pipe in greenway |
| Turkey Vulture | 1110 | C5 | 1 | soaring |
| N. Shoveler | 1015 | D3 | 8 | flying high (over 100') into water |
| W. Bluebird | 1015 | D3 | 1 | perched on post in green field |
| Yellow-rumped Warbler | 1015 | D3 | 4-5 | foraging in green field |
| Turkey Vulture | 1020 | B4 | 2 | soaring (<100') |
| Turkey Vulture | 1037 | D3 | 1 | soaring low (400' > 100') |
| N. Harrier | 1200 | B3 | 1 | foraging low (>10') |
| Turkey Vulture | 1200 | C4 | 4 | soaring (>100') |
| Turkey Vulture | 1208 | B4 | 6 | soaring; 4 are the same as 1200 |
| Turkey Vulture | 1220 | B3 | 1 | soaring (<100') |
| | | | | |
| | | | | |
| | | | | |

Incidental Observations and Notes:

patches & puddles of water scattered on the runways