APPENDIX A

2005 – 2006 LAX Wildlife Hazard Assessment

Note: Certalerts, Advisory Circulars, and regulations are frequently changed or updated, always verify that the version attached herein is the most current. Contact FAA or Wildlife Services (Chapter 9) or consult the FAA website at **www.faa.gov/arp/hazard.htm** for the latest version.

FAA APPROVED
JAN 30 2017
FAA Approval:

WILDLIFE HAZARD ASSESSMENT FOR LOS ANGELES INTERNATIONAL AIRPORT LOS ANGELES COUNTY, CALIFORNIA

(April 2005-March 2006)

Submitted by:

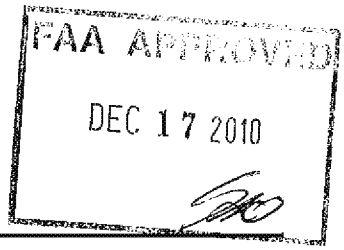
United States Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services
7333 World Way West
Los Angeles, CA 90045
(310) 646-6638

Todd Pitlik
Wildlife Biologist

Work Performance per Cooperative Service Agreement No. 06-73-06-2052-RA
Project was monitored by Craig Coolahan, State Director, CA

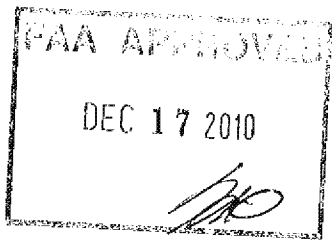
Table of Contents

APPENDICES



LIST OF ACRONYMS

AGL	Above Ground Level
AOA	Air Operating Area
CDFG	California Department of Fish and Game
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FOD	Foreign Object Debris/Damage
ILS	Instrument Landing Systems
MBTA	Migratory Bird Treaty Act
NOTAM	Notice to Airmen
LAX	Los Angeles International Airport
T&E	Threatened and Endangered Species
USFWS	U.S. Department of Interior, Fish and Wildlife Service
WHA	Wildlife Hazard Assessment
WHMP	Wildlife Hazard Management Plan
WS	U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (formerly Animal Damage Control [ADC])



1.0. INTRODUCTION

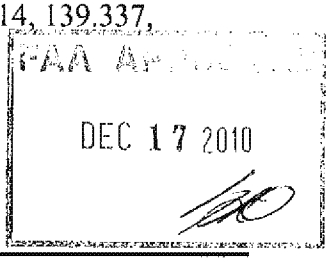
1.1. OVERVIEW OF WILDLIFE HAZARDS TO AIRCRAFT

Collisions between aircraft and wildlife are a concern throughout the world because they threaten passenger safety (Thorpe 1997), result in lost revenue and costly repairs to aircraft (Milsom and Horton 1990, Linnell 1996, Robinson 1997), and can erode public confidence in the air transport industry as a whole (Conover et al. 1995). In several instances, wildlife-aircraft collisions in the United States have resulted in human fatalities, the most recent of which occurred in 1995 when an Air Force E-3B AWACS aircraft collided with a flock of Canada geese on Elmondorf Air Force Base, Alaska, killing all 24 passengers and crew (Gresh 1996, Ohashi et al. 1996). This is of course, an extreme example and most wildlife strikes do not result in fatalities, but the safety hazards are very real and the proportion of wildlife strikes that result in damage is often substantial enough to merit closer scrutiny by the Federal Aviation Administration (FAA).

The FAA is responsible for setting and enforcing the Federal Aviation Regulations (FAR) and policies to enhance public safety. To ensure compliance with Code of Federal Regulations (CFR) Part 139.337 (Appendix 3), the FAA requires certified airports to conduct a wildlife hazard assessment (WHA), and if necessary, establish a wildlife hazard management plan (WHMP) when any of the following events occur on or near an airport:

(1) An air carrier aircraft experiences multiple bird strikes or engine ingestion.
(2) An air carrier aircraft experiences a damaging collision with wildlife other than birds.
(3) Wildlife of a size or in numbers capable of causing an event described in (1) or (2) of this section is observed to have access to any flight pattern or movement area.

A variety of authorized methodologies are utilized by WS to decrease wildlife hazards, which are often dictated by the target species, season, habitat characteristics of the airfield, and a host of other variables. It is therefore important to consider the ecological characteristics of local and migratory patterns when establishing a wildlife control program. The WHA provides the framework through which a more complete and site-specific understanding of wildlife hazards on an airport are developed. These assessments typically last a year because wildlife populations, especially migratory birds, exhibit seasonal fluctuations in behavior and abundance. On completion of the assessment, recommendations to reduce wildlife hazards can be made which are based on an analysis of the data collected. If it is determined from the study that significant wildlife hazards are present, a WHMP is written that addresses the responsibilities, policies, and procedures necessary to reduce wildlife hazards. The WHA provides the basis from which the management plan is developed. WHMP are written in accordance with CFR 14, 139.337, subpart (c), (d) and (e) and are the responsibility of the airport.



1.2. LEGAL AUTHORITY OF WILDLIFE SERVICES (WS)

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (the name was officially changed from Animal Damage Control [ADC] in August of 1997) program has a Memorandum of Understanding (MOU) with the FAA (Appendix 4) to resolve wildlife hazards to aviation, thus enhancing public safety. The MOU establishes that Wildlife Services (WS) has the expertise and will provide technical and operational assistance (if funded by an airport) to alleviate wildlife hazards at airports. WS may conduct a WHA to serve as a basis for the WHMP, but the responsibility of development, approval, and implementation of the wildlife hazard management plan still lies with the airport manager.

The primary statutory authority by which WS operates is the Animal Damage Control Act of March 2, 1931, as amended (7 U.S.C. 426-426c; 46 Stat. 1468). WS has the authority to manage migratory bird damage as specified in the CFR. In addition, the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 authorizes and directs the Secretary of Agriculture to cooperate with States, individuals, public and private agencies, organizations, and institutions in the control of nuisance mammals and birds deemed injurious to the public.

The MOU and legislation allows WS to conduct the following for airports: 1) initial on-site investigations; 2) biological assessments (short-term studies); 3) WHA; 4) wildlife management techniques, and; 5) WHMP.

In October 1998, Los Angeles International Airport (LAX) entered into a cooperative service agreement with WS to conduct a WHA in accordance with CFR 14, Part 139.337, subpart (a) and (b). This study was precipitated by a concern for public safety resulting from several multiple bird strikes.

2.0. OBJECTIVES

The objectives of this WHA were to:

1. Review available wildlife strike records.
2. Determine wildlife population parameters such as abundance and periods of activity (e.g. seasonal), with a particular emphasis on the species most threatening to aircraft safety.
3. Identify and quantify attractive wildlife features and land-use practices at LAX to surrounding areas that may contribute to wildlife hazards on the airfield.
4. Provide management recommendations for reducing wildlife hazards at LAX to serve as a framework in the development of a WHMP.

3.0. BACKGROUND

3.1. LOS ANGELES INTERNATIONAL AIRPORT

LAX is a 3,425 acre airport located between Lincoln Boulevard to the north and Imperial Highway to the south, Pershing Road to the west, and Sepulveda/Aviation Boulevards to the east. LAX is at an elevation of 125.55 feet above mean sea level and local climatic conditions are characterized by warm-hot summers and mild winters. Average temperatures range from approximately 48°F in December to 77°F in August and the average annual rainfall in Los Angeles is approximately 12 inches per year.

As a representative of LAX, it is the airport manager's responsibility to provide a safe and efficient operating environment for its patrons, and negligence in this regard can result in a tremendous liability incurred by the airport and manager alike (Michael 1986). Wildlife hazards on the airfield are a primary safety concern, and therefore, must be addressed. LAX requested WS to conduct a WHA due to a multiple bird strike involving a Boeing 757 during an aircraft departure roll on Runway 25R. United Flight 1710, ingested several birds which resulted in bent turbine blades in both engines.

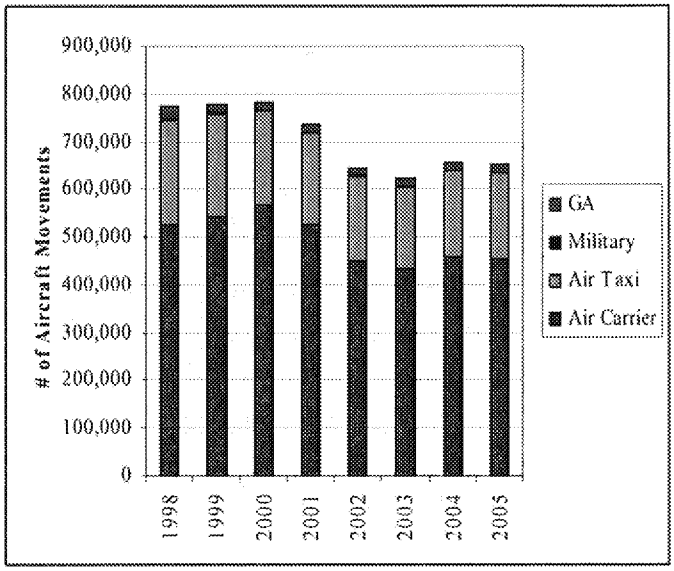


Figure 1. Number of aircraft movements at LAX (1998-2005).

3.2. AIRCRAFT OPERATIONS

LAX is a public facility servicing the commercial air transport industry, general aviation, air taxi, and military aircraft and had a total of 650,629 operations (an operation in defined as one takeoff or landing). In 2005, 70% air carrier (commercial passenger carriers), 27% air taxi (charter flights), 2% general aviation, and less than 1% military (Fig. 1). The number of military flights has decreased from 3,326 in 1998 to 2,607 in 2005 and the number of general aviation flights also decreased from 26,031 in 1998 to 15,071 in 2005. The number of air carrier operations has increased by 23% since 1991.

3.3. WILDLIFE STRIKE ANALYSIS

Bird Strike Committee Canada (Transport Canada 1992) developed a bird strike definition that has since been adopted by the FAA, International Civil Aviation Organization (ICAO), Bird Strike Committee USA, Bird Strike Committee Europe, and the U.S. Air Force. Under this definition, a wildlife strike is considered to have occurred if:

1. A pilot reports a strike.
2. Aircraft maintenance personnel identify damage as having been caused by a bird or mammal strike.
3. Personnel on the ground report seeing an aircraft strike one or more birds or mammals.
4. Bird or mammal remains, in whole or part, are found on any airside pavement area or within 200 feet of the runway centerline, unless another reason is identified.

Wildlife strike data provides valuable information on wildlife hazards at airports, including the species that are struck, seasonality, and time of day. National statistics for the period of 1990-2005 based on pilot-reported strikes indicated that gulls (23%), doves/pigeons (14%), raptors (13%), waterfowl (10%), sparrows (7%), and starlings (6%), were the most frequently struck bird groups. Gulls (27%) were involved in 2.4 times more strikes than waterfowl (31%), but waterfowl were involved in more damaging strikes than were gulls, which, were involved in the greatest number of bird strikes (29%) that had a negative effect-on-flight. During the 16-year period, 144 reported strikes resulted in 172 human injuries and 9 fatalities (Cleary et al. 2005).

Aircraft components that were affected the most by bird strikes were damages to engines at 32% and no damages were reported in 85% of the strikes from 1990-2005. The majority of reported strikes occurred 60% of the time at altitudes 100 feet, 73% at 500 feet, and 92% at 3,000 feet. The data also indicated that most bird strikes occurred during the late spring through early fall (July - October) with the fewest strikes occurring during the winter months of December through February. Conversely, mammal strikes were most abundant during the late summer and fall months of July through November and at night or 63%. Finally, most of the bird strikes occurred during the day (63%).

These data should be interpreted cautiously, however, because it has been demonstrated that pilots are less likely to report strikes around the crepuscular periods of dawn and dusk (Linnell et al. in press), presumably due to decreased visibility. Based on pilot-reported data (Cleary et al. 1998), the Boeing 737 (20%), DC-9/MD80 (9%), and British Aerospace (5%) were involved in more strikes than any other type of aircraft, probably because they were flown most frequently. No other aircraft comprised more than 4% of the reported strikes from 1991-1997.

Wildlife strike rates, the number of strikes per 10,000 aircraft movements, provides a useful index for assessing the severity of wildlife hazards at a given airport and for monitoring hazard abatement efforts. Consequently, the number of aircraft operations, coupled with the accurate collection of bird strike data should be a priority for airport managers. Bird strike statistics based solely on pilot reports are generally unreliable and yield incomplete information because most pilots do not report strikes. By collecting the remains of dead birds found on runways during routine runway searches, airport managers can obtain information that would have otherwise been unavailable (Linnell et al. 1996), augmenting a more accurate assessment of the actual bird strike situation, due to factors such as decreased pilot acuity towards birds during critical phases

of flight, size of the bird, flock size, weather conditions, time of day, or heightened pilot awareness during migratory seasons (Linnell et al. in press). In the future, pilots, tower, and airport personnel should be strongly encouraged to complete and submit the FAA Strike Report Form (FAA 5200-7 [Appendix 5]) every time a collision with wildlife occurs or the remains of a dead bird(s) is found on the runway. The FAA has recently setup a system for reporting strikes via the Internet at the following address: ***http://www.faa.gov/arp/birdstrike/*** for those with internet access. All bird remains that are found should be retained until they can be positively identified by a qualified individual, or if the remains are unidentifiable, LAX may send the remains in a re-sealable plastic bag, attach them to Form 5200-7, and send it (at not cost to the airport or aircraft owner) to the address on the form (FAA Office of Safety and Standards, AAS-310, 800 Independence Ave. SW, Washington DC 20591). Send whole feathers when possible because diagnostic characteristics are often found in the fluffy part or barbs of the feather base. In addition, blood (DNA analysis), beaks, feet, bones, and talons also are useful diagnostic material.

Wildlife strikes for LAX were obtained from the FAA database. This information represents strikes reported by pilots, airport operations, and maintenance staff. A total of 758 bird strike incidents were reported during the period of January 1990 – December 2005. The number of bird strikes reported at LAX has increased from 19 in 1991 to 70 in 2005 and the average number of strikes reported from 1990-1997 was 24 and from 1998-2005 was 71 (Fig. 2). This increase may be due to a greater awareness of bird strike reporting by LAX personnel and an increase in aircraft movements (Fig. 1). Single incidents involving one or multiple birds included the following for: 1) top five species: a) unknown birds = 373; b) American kestrels = 93; c) rock doves = 80; d) Western gulls = 17, and; e) red-tailed hawks = 11 and 2) top five guilds: a) raptors = 109; b) doves = 95; c) gulls = 72; d) perching birds = 48, and; e) water birds (ducks, egrets, herons, and pelicans) = 15. Unknown birds often resulted from the lack of evidence collected for identification following a bird strike.

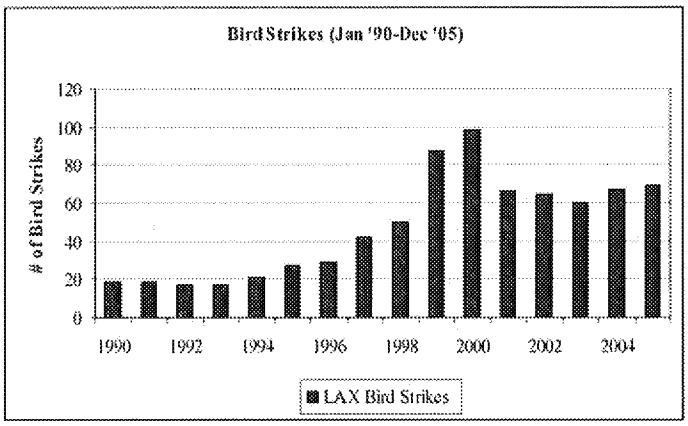


Figure 2. Total number of wildlife strikes at LAX (1990-2005).

3.4. CURRENT WILDLIFE HAZARD MANAGEMENT

Wildlife strikes are reported by pilots to the tower and/or airport operations, which are staffed 24/7. Airfield operations are first responders to wildlife hazard situations and will either take immediate action or notify WS to reduce the hazard. Pyrotechnics are required to be carried in all operations vehicles and dispersal efforts initiated when birds are observed flying across runways or aggregating at the approach ends of the runways. Since larger birds, e.g., herons,

hawks, and waterfowl, are more likely to damage aircraft, collisions with smaller flocking birds represent an equally potential damage threat to aircraft and should not be disregarded.

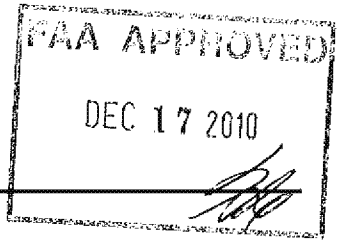
A number of authorized actions can be taken to decrease wildlife hazards, depending on the species, time of year, ecological situations on the airfield, habitat characteristics on the airfield, and a number of other variables. It is therefore necessary to take into account the ecological behavior of wildlife observed on the airfield, particularly in relation to specific environmental characteristics when establishing a wildlife control program. A variety of control methods are available for managing hazardous wildlife species observed at LAX. See results section for a species by species discussion of authorized techniques, which does not preclude the use of other effective mitigation measures. Refer to Hygnstrom et al. (1994) for a detailed and comprehensive two-volume manual of *Prevention and Control of Wildlife Damage*. It is important to remember that a little imagination and persistence greatly augments the duration and effectiveness of any bird hazard reduction measure.

4.0. LEGAL STATUS OF WILDLIFE SPECIES

Most forms of wildlife and their habitat are protected by one or more Federal, State, and/or Municipal laws. Before administering any control action at LAX, whether lethal or not, the legal status of the target species should first be determined and potential non-target animals identified. Many of the agencies involved in regulating wildlife will require permits to harass or lethally control wildlife, and will issue these permits depending on the species and method of control involved. LAX is responsible for adhering to the current regulations regarding wildlife control and for obtaining the appropriate permits to take and/or harass specific types of wildlife. Refer to Appendix 6 for a directory of agencies responsible for various aspects of wildlife management.

4.1. FEDERAL REGULATIONS

The U.S. Government has passed several Acts for the protection of wildlife including the Migratory Bird Treaty Act (MBTA), Lacey Act, Endangered Species Act, Eagle Protection Act, National Environmental Policy Act, and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). These are the basis of most wildlife regulations that have been issued in the CFR. Several agencies are responsible for implementing these regulations and many of these regulations affect wildlife control operations at airports. Federal wildlife laws are mostly administered by the U.S. Fish and Wildlife Service (USFWS), and primarily involve birds and animals protected under the MBTA and the Endangered Species Act. LAX possesses a Federal depredation permit from the USFWS and this permit must be updated annually unless otherwise stated on the permit. WS can assist LAX by completing a Form 37 Damage Report to be submitted along with the application for a USFWS Depredation Permit (Appendix 7).



4.2. STATE AND LOCAL REGULATIONS

The State of California accepts the Federal depredation permit for nongame bird species, but requires a special permit for mammals and game birds (Table 1). These regulations and statutes are primarily contained in the Fish and Game Code of California. The California Department of Fish and Game (CDFG), the agency responsible for administering wildlife enforcement, publishes these statutes in a booklet (Fish & Game Code 1999) which is available from them upon request. Los Angeles County and municipality firearms regulations (see directory in Appendix 6) may also affect LAX wildlife control operations, consequently LAX personnel should check with city and county officials prior to conducting operational control measures.

Table 1. Permits necessary for lethal control for Los Angeles County.

CATEGORY	WILDLIFE SPECIES	STATE PERMIT [1]	FEDERAL PERMIT
RESIDENT NONGAME BIRDS	Starlings, house sparrows	No	No
RESIDENT GAME BIRD	Quail, turkey, ring-necked pheasant, grouse, partridge	Yes	No
MIGRATORY GAME BIRDS	Ducks, geese, coots, and mourning doves	No	Yes
MIGRATORY NONGAME BIRDS	All species except game birds, resident nongame birds, and domestic and exotic birds	No	Yes
DEPREDATION ORDER BIRDS [2]	Crows, blackbirds, and cowbirds	No	No
DOMESTIC BIRDS	Rock doves (feral pigeons)	No	No
FURBEARERS	Fox and raccoon	Yes	No
NONGAME MAMMALS	All species of mammals, including coyotes, except game, furbearers, domestic mammals, and fully protected wildlife listed in Appendix 2	No	No
GAME MAMMALS	Deer, elk, bear, wild pigs, jackrabbits, other rabbits, tree squirrels	Yes	No
FERAL DOMESTIC MAMMALS	Dogs, cats, livestock	No - Call local animal control	No
REPTILES AND AMPHIBIANS	All reptiles and amphibians except those listed as threatened or endangered in Appendix 2	No	No
FULLY PROTECTED WILDLIFE	Threatened and Endangered species listed in Appendix 2, and/or mountain lions	Yes	Yes

[1] Control actions requiring a state permit should be coordinated through the Regional Biologist with the Department of Fish and Game.

[2] May be taken without permits Awhen concentrated in such numbers and manner as to constitute a health hazard or other nuisance@ (50 CFR '21.43).

5.0. DESCRIPTION OF STUDY SITE AT LAX

This WHA identified wildlife hazards within a general zone that covered a five-mile radius of the airport because most strikes occur when aircraft are at low altitudes, typically within 5 miles of the airfield or less. A particular emphasis was placed on areas within a two-mile radius of the runway centerline (hereafter referred to as the critical zone) because many forms of wildlife, especially birds, will readily travel this distance in a short period of time. Turbine powered aircraft are generally at least 2,000 feet above ground level (AGL) by the time they reach the two-mile threshold and are above the airspace where most birds are found. Efforts were also made to identify attractants that may draw or support significant numbers of hazardous wildlife beyond the five-mile threshold.

5.1. FACILITIES

Four east/west parallel runways exist at LAX with the following lengths listed as follows: 24R/6L (8,925 ft), 24L/6R (10,285 ft), 25R/7L (12,090 ft), and 25L/7R (11,095 ft). The FAA control tower, firehouse, and terminals are located between the four parallel runways on the airport. These facilities were monitored for wildlife activity because they can provide nesting habitat, loafing areas, and food sources for a variety of birds, e.g., crows, feral pigeons, mourning doves, and house sparrows.

5.2. WILDLIFE

LAX and the surrounding areas are diverse in wildlife and several areas tend to attract wildlife, which were observed on the LAX airfield within most survey locations (Appendix 1). Bird strike data often show that the larger flocking birds, such as gulls, wading birds, and waterfowl, are considered to be more of a potential threat to aviation safety than smaller birds such as starlings, blackbirds, and feral pigeons, which can also present significant hazards in the formation of tight flocks comprised of hundreds of individuals. Solitary birds, i.e., hawks and kites, also present a concern due to their soaring and hovering behavior. LAX attracts a wide variety of bird species throughout the year.

5.3. HABITATS

The availability of food, water, and habitat attracts wildlife to airports and habitat management can provide the most effective long-term solution for excluding wildlife from the airfield. However, before implementing habitat modification, it is important to avoid redirecting wildlife into critical areas on the airfield. For this reason, the identification of existing habitat characteristics need to be incorporated with wildlife use patterns.

Habitats immediately surrounding LAX include: 1) urban/industrial (east ands south), 2) residential (north and south), and; 3) dunes and open ocean (west).

Water – Temporary standing water forms on taxiways and low lying short grass areas following periods of moderate to heavy rainfall. The Argo Ditch is located on the north side of the airport and runs parallel to Runway 24R. Runoff and rainwater accumulates at the east end of the ditch year-round and flows to the west end after periods of heavy rainfall. In addition, the Pacific Ocean is in close proximity to the airport and is approximately 3,200 feet west of LAX.

Vegetation – Herbaceous and woody vegetation provides the majority of food and cover requirements for wildlife at LAX and are listed as follows: 1) Cattails in Argo Ditch East; 2) shrubs and herbaceous plants in Argo Ditch Mid and West; 3) Native grasses and herbaceous plants surrounding the runways; 4) Acacia trees west of 7L/7R and north of Argo Ditch West, and; 5) Eucalyptus tree north of Argo Ditch West. Removal of this vegetation is important to habitat reduction on the airfield and must be monitored on a regular basis.

Structures – Terminals, cargo warehouses, and office buildings provide perching and roosting sites for birds. In addition to buildings, the perimeter fence is frequently used by a variety of birds. Raptors, i.e., hawks and kestrels, perch on ILS structures, runway markers, and glide scopes, and gulls prefer to perch on utility lights.

5.4. THREATENED AND ENDANGERED SPECIES (T&E)

Los Angeles County hosts a number of T&E species that are granted protection under the auspices of Federal or State regulations (Appendix 2). The USFWS and CDFG should be contacted annually to obtain updated species lists and should be reviewed prior to conducting operational control work such as hazing, shooting, trapping, toxicant utilization, or habitat manipulation to remain in compliance with Federal and State wildlife regulations. LAX may be required to mitigate for actions that destroy or negatively alter habitat deemed critical to any of these species.

6.0. METHODS

6.1. ON-AIRPORT BIRD SURVEYS

Bird abundance and activity patterns were surveyed on the airfield using a standardized sampling design, based on the USFWS Breeding Bird Survey. Bird numbers were surveyed at approximately two-week intervals from April 2005 through March 2006 with the start-time of each count varied, emphasizing on the crepuscular periods of dawn and dusk. Time-area counts were conducted at 14 stations (Appendix 9) at LAX airport, which represented a variety of habitat types throughout the airfield, ease of access, and area of coverage. Each station was surveyed for a 3-minute period using the naked eye, and all birds that were seen within a 1/4-mile radius were recorded. Binoculars were used only to verify observations and to key-out questionable species. The species, activity, e.g. flying, loafing, and nesting, habitat type, number seen, and any other pertinent observations were also noted. Data collected during these surveys

will serve as a baseline for comparison of wildlife activity in subsequent years, enabling LAX management to assess the efficacy of wildlife control methods.

Avian Crossing Surveys were incorporated with the time-area counts at six stations adjacent to the runways (Station #'s 2, 4, 5, 10, 12, and 14). A ten minute survey tallied and mapped the numbers of birds flying, perching, loafing, or foraging near the runways and was conducted immediately following the three-minute bird count. In addition, the number of aircraft movements were tallied and mapped on the survey form and submitted for data analysis to the USDA research station in Sandusky, OH.

6.2. OFF-AIRPORT BIRD SURVEYS

Off-airport bird surveys were conducted at the following sites: A) Waterview Street; B) Vista Del Mar Park; C) Hyperion Wastewater Treatment Plant; D) Employee parking lot B; E) Van/limo lot; F) Aviation Boulevard - FAA area; G) Southwest Airlines Cargo Building rooftop parking lot, and; H) Westchester Recreation Center. The off-airport surveys were conducted four times per month on concurrent days as the on-airport bird surveys. Off-airport sites were selected due to a wildlife attraction potential into the airport. At each site, species, number, activity, and cover type were recorded. These incidental surveys were not used in the statistical analysis of individual species.

6.3. ANALYSIS OF DATA

For analysis purposes, common wildlife species were categorized into groups or guilds (Appendix 1). Species were placed into their respective guilds based on similar behavioral characteristics, not on phylogenetic (ancestral) or taxonomic relationships, although the guilds often paralleled taxonomic lines. This approach was selected because behavioral attributes play a significant role in predisposing some species of wildlife to collisions with aircraft. In addition, wildlife control strategies are often selected based on their ability to exploit an animal's specific behavior(s) therefore, species that exhibit similar behaviors and life history attributes generally require similar control methods.

6.4. SURVEY AND EVALUATION OF WILDLIFE ATTRACTANTS

Birds and mammals require a variety of habitats in order meet their basic needs for food, water, and cover. American kestrels migrate to LAX each year to feed on grasshoppers in short grass areas adjacent to the runways and perch on ILS structures, glide scopes, and runway markers. Crows, meadowlarks, doves, feral pigeons, herons, egrets, starlings, sparrows, and small passerines are also attracted to short grass areas to feed on seeds, insects, and small rodents. Waterfowl and wading birds feed and loaf in temporary standing water inside Argo Ditch and in low-lying areas following heavy rains. Cowbirds, finches, and blackbirds feed on grass seeds and roost in cattails inside Argo Ditch. Larger raptors, such as red-tailed hawks and peregrine falcons, perch on runway structures and fly over short grass and ditch areas to feed on small rodents and

birds. Acacia trees produce fruited seeds in the summer that attract large numbers of juvenile starlings and eucalyptus trees provide nesting habitat and cover for a variety of raptors and smaller perching birds.

Habitat management provides the most effective long-term remedial measure for reducing wildlife hazards on or near airports, which includes the physical removal, exclusion, or manipulation of cover, nesting habitat, or food items that attract wildlife. The ultimate goal is to make the environment unappealing to the species posing the greatest hazards to air traffic. This is most easily accomplished by promoting an airport environment with habitat that is monotypic or uniform throughout.

Specific types of habitat and food sources were identified at LAX with the goal of reducing the potential attractiveness to hazardous wildlife. Habitat alterations on property owned by LAX can be readily accomplished by the airport. However, it will be necessary to meet with the land owners of adjacent properties to obtain their support. In some cases, the landowner may be unwilling to cooperate with LAX, in which case the airport should continue to monitor land-use activities of off-airport property and notify the FAA if the hazards reach a level that is seriously compromising air safety.

7.0. RESULTS AND DISCUSSION

7.1. ON-AIRPORT BIRD SURVEYS

7.1.1 ALL SPECIES COMBINED

The overall bird counts for all species combined at LAX indicated several peaks throughout the year (Fig. 3). The highest number of birds were in observed in January (1,416), November (889), and June (893). Species of birds ranking the highest by month are listed as follows: 1) January = European starlings (604 or 43%) and Western meadowlarks (461 or 33%); 2) November = European starlings (296 or 33%) and Western meadowlarks (257 or 29%), and; 3) June = European starlings (364 or 41%) and American crows (297 or 33%). The presence of European starlings and American crows coincided with the nesting season and Western meadowlarks with the fall/winter migration.

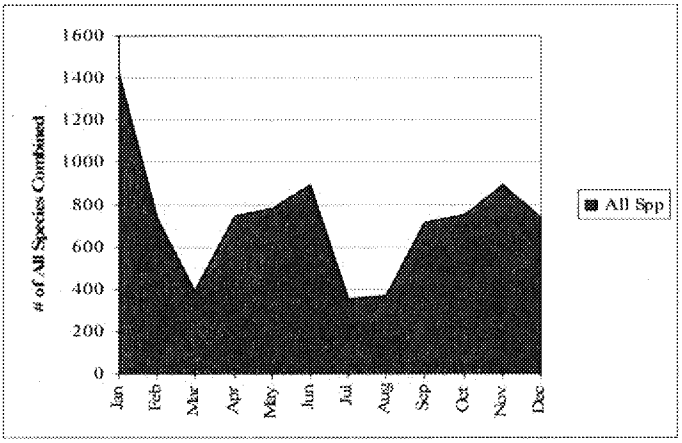


Figure 3. Summaries for all species of birds combined.

The overall bird counts for all species combined at LAX ranked the highest at stations 1, 3, and 9 (Fig. 4). Species of birds ranking the highest by Station # are listed as follows: 1) Station 3 =

European starlings (677 or 48%), Western meadowlarks (310 or 22%), and American crows (267 or 19%); 2) Station 9 = European starlings (476 or 39%), Western meadowlarks (260 or 21%), and American crows (113 or 9%), and; 3) Station 1 = Western meadowlarks (401 or 37%), American crows (247 or 23%), and European starlings (242 or 23%). The presence of European starlings and American crows coincided with the nesting season and Western meadowlarks with fall/winter migration.

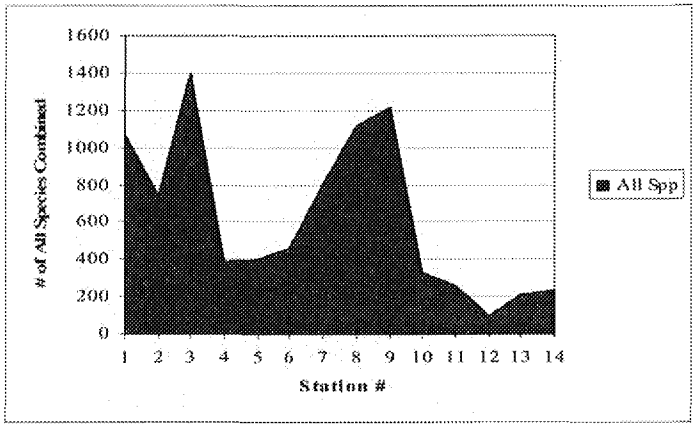


Figure 4. Summary totals for all species combined by station #.

There were individual differences in geographical use-patterns for several species that will be discussed subsequently. It is important to realize that while the overall frequency may have been similar for most of the stations, the total number of individuals at each station may have varied greatly because of the gregarious (flocking) nature of some species and the solitary behavior of others. The total numbers of birds were summarized by species with the mean (average) number of individuals per observation and the minimum and maximum number of birds observed during any single observation (Table 2).

Table 2. Abundances of prominent wildlife species and guilds observed at the LAX during surveys conducted four times per month from April 2005 through March 2006.

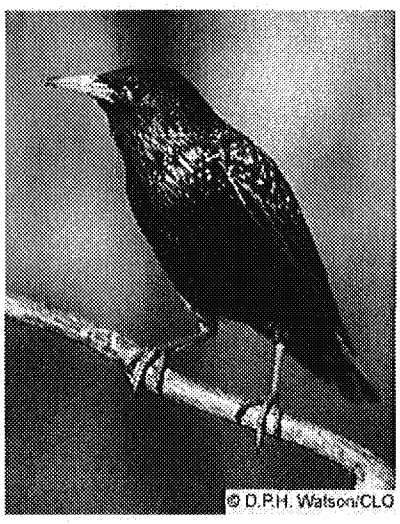
Guild And Species[1]	*Total No. Animals* [2]	*Range*[3]	*Mean Flock Size*[4]	*Standard Error*
European Starlings	2,622	1-350	22.5	32.78
Doves	277	1-30	3.7	5.10
Mourning doves	121	1-30	3.1	5.07
Pigeons	156	1-25	4.4	5.11
American Crows	1,799	1-70	7.0	13.76
Western Gulls	166	1-50	4.4	8.52
Hawks	577	1-7	1.2	0.80
American kestrel	467	1-7	1.2	0.85
Red-tailed hawk	110	1-3	1.2	0.44

Western Meadowlarks	2,022	1-80	16.0	16.94
Shorebirds	100	1-10	3.5	2.53
Killdeer	69	1-10	3.8	4.27
Whimbrel	30	2-5	3.0	1.41
Sandpiper	1	--	3.6	2.19

[1] This table only includes the most abundant or hazardous species from each guild.
[2] This was derived by summing all counts taken throughout the year, therefore, the total may include some of the same individuals that were present on the airfield day after day.
[3] This gives the highest and lowest number of birds observed during any single count at a station.
[4] Based on the mean number of birds per station during each survey and averaged across months. This did not take into account differences in seasonal abundance or variability in habitat-use patterns among stations (these variables were considered in the species/guild-specific section for each respective species/guild).

Summaries are designed to provide an average number of animals that an airport manager (or his designated wildlife coordinator) may expect to encounter when dispersing birds, but it must be realized that wildlife populations are dynamic and their use of the airfield will vary over time.

7.1.2 EUROPEAN STARLINGS AND BLACKBIRDS



Description - European starlings are small stocky birds with a short tail and bright yellow bills. Adult plumage is black with a purple hue and change to a light heavily speckled brown in fall and winter. Starlings were introduced into North America from Europe, are cavity nesters, and will use any structure with holes for nesting. Blackbirds are medium-sized songbirds with heavy bills. They have iridescent black feathers and medium length tails. All are gregarious, especially in winter when they form roosts in the thousands, sometimes comprised of mixed species. Large flocks begin to form roosts as early as August and disband by April. All blackbirds and starlings are diurnal, i.e., active during daylight hours.

General Abundance at LAX - European starlings and blackbirds are common residents throughout Los Angeles County. Starlings, while not technically classified as blackbirds, were grouped into the same category due to similarities in behavioral and morphological characteristics, especially as it relates to bird strike hazards. Starlings were observed throughout the year and peaked in January and April – June with flocks ranging from 1 to 350 birds (Fig. 5).

Starling observations ranked the highest at Stations 3, 8, and 9 (Figure 6). Stations with the highest number of observations were located on the north and southwest sides, which provided open areas for foraging (Appendix 9). Stations 3, 8, and 9 had the highest frequency of occurrence for starlings during the survey period (Fig. 7). Frequencies are listed for the highest ranking Station #'s as follows: 1) Station 8 = 77%; 2) Station 9 = 44% and; 3) Station 3 = 60%.

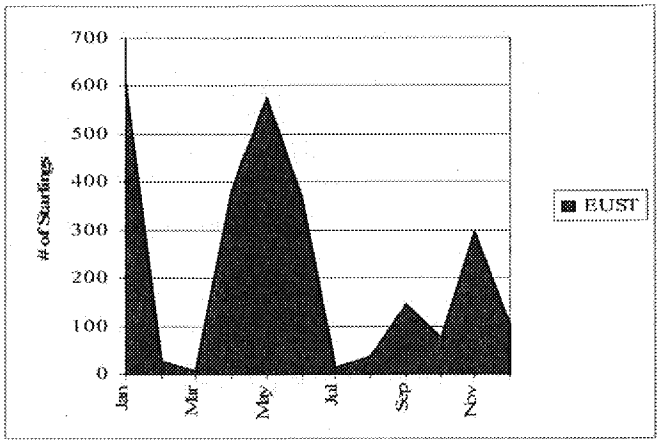


Figure 5. Total numbers of European starlings by month at LAX (April 2005 – March 2006).

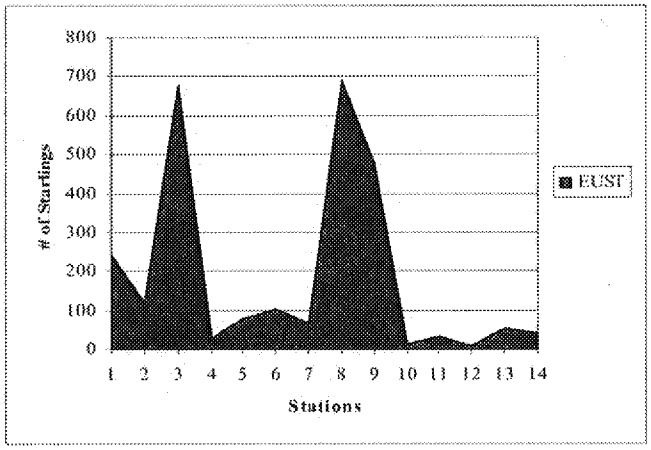


Figure 6. Total numbers of European starlings by Station # at LAX (April 2005 – March 2006).

Attractants - Blackbirds are primarily granivorous, whereas European starlings are omnivorous and require a higher protein diet consisting of mainly fruits, insects, and some grain. Blackbirds are attracted to a variety of habitats depending on the species while Brewer's blackbirds and starlings are attracted to urban areas, especially parks and golf courses. Starlings also prefer open areas on the airfield for foraging and cargo warehouses and trees for nesting.

Damage - Blackbirds and European starlings are considered a threat to aviation because of the large flocks they form when roosting in wetland vegetation (blackbirds) and foraging in short grass areas (starlings). In addition, starling droppings in buildings can become a source of several infectious diseases (Appendix 12). Starlings can also create a fire hazard in combustible structures due to the annual deposit of flammable dried grasses and twigs in their nests each year.

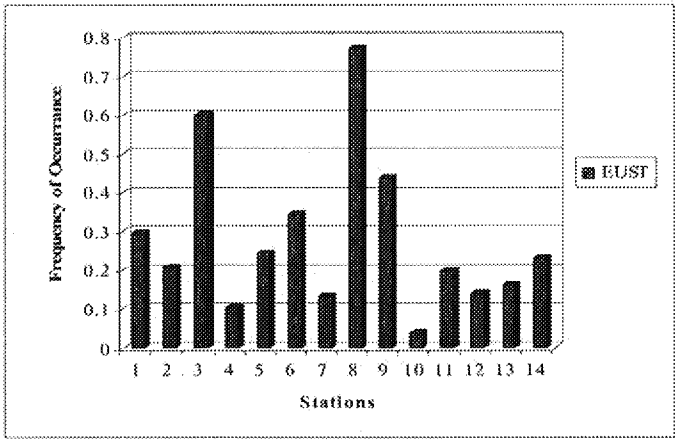


Figure 7. Frequency of European starling observations to all species combined by Station # at LAX (April 2005 – March 2006).

Legal Status - Blackbirds are classified as migratory nongame birds (Table 2), but can be taken when dense concentrations

of birds constitute a health hazard. However, the starlings are categorized as a non-native introduction, which does not afford it any state or federal protection and can be removed at any time without a permit.

Control Measures – Flocks of birds foraging on the airfield can be dispersed with pyrotechnics, bioacoustics, and visual repellents. However, birds often move to another location on the airfield without much effect. To increase the effectiveness of harassment techniques, concentrate efforts in the early morning and late afternoon hours when the birds are most active. Shooting may become a necessary reinforcement technique if the birds become habituated to pyrotechnics, which tends to disperse concentrated flocks of hundreds to thousands of birds. The proper and consistent use of decoy traps can remove the highest number of birds over the shortest period of time. A total of 6,635 European starlings were removed from LAX from 2004 – 2005 by decoy trapping, which has drastically reduced the number of airfield dispersals in 2006.

1. ***Mechanical/Habitat Control at LAX*** – The timely use of harassment techniques provides an immediate effect of bird dispersal from the runway environment. Vehicle/shooting harassment and pyrotechnics can effectively disperse flocks from the airfield when aircraft are not in the process of taking off or landing. Habitat management, such as removal of trees (starlings) and cattails in watersheds (blackbirds), can make the area less attractive for feeding and roosting. Mylar tape stretched at 5-10 foot intervals across the infield also provides a short-term deterrent to feeding flocks, but can create a FOD (foreign object debris) hazard to aircraft if it breaks due to strong winds.

2. ***Chemical Control - DRC-1339*** - DRC-1339, (3-chloro-*p*-toluidine hydrochloride) under the direction of WS, is available for use in California to target red-winged blackbirds, starlings, and brown-headed cowbirds in non-crop staging areas associated with roosts (Appendix 11). When mixed in flocks with one or more of the above mentioned species, American crows, Brewer's blackbirds, and yellow-headed blackbirds may also be considered target species. DRC-1339 can be used to significantly reduce the population when decoy trapping, habitat modifications, and frightening techniques are ineffective. A 98% concentration of the more dilute Starlicide, is a slow acting poison that kills most birds from 12–72 hours after ingestion by disrupting kidney function of the target species. It is species specific and has virtually no secondary toxicity hazards due to the metabolic breakdown of the compound into non-toxic metabolites. Mammals and birds such as house sparrows are unaffected at the delivered concentrations. The secondary poisoning potential of DRC-1339 to scavengers is low as it is less toxic to many other species including raptors and most mammals (DeCino et al. 1966, Timm 1994). The label (Appendix 11) must be strictly followed and the CDFG should be contacted prior to use so they can address issues that may be raised if the public reports the finding of dead birds. An application form must be filled out by the applicator to keep on record and must include the amount of chemical used, the number of birds taken, application sites, and the disposition of unused baits.

A. ***Pre-baiting*** - Birds should be pre-baited with untreated grain placed in feeders for at least a week at staging areas away from public access. After most of the birds are accustomed to feeding, untreated baits are replaced with treated baits in the same containers and locations. The pounds of pre-bait used per day needs to be monitored to determine the amount necessary for the first treatment. Bait consumption will drop off daily thereafter, requiring less and less treated baits. Baiting sites must be carefully monitored to make sure non-target birds are not feeding on the bait.

B. ***Baiting with toxicant*** - Prepare baits the day before they are to be put out to give them time to air dry properly. All baits should be used within a week or disposed of according to label instructions; DRC-1339 baits discolor and lose their potency in a short time. Screened cracked corn should be used for blackbirds and a protein pellet such as calf manna can be used for starlings. About 2 pounds of bait should be prepared for every 1,000 birds in the roost. The abatement program should begin as soon as large numbers of blackbirds or starlings are seen staging on LAX prior to going to the roost. Subsequent programs conducted during the same winter should be planned only if warranted. Baits should be placed out about 2 hours before sundown or an hour before sunrise and retrieved when birds stop feeding, usually about 3 hours later. The applicator must remain on site and the baits should be watched from nearby to ensure that non-target species are not present. Treatment should continue for a week or until all birds have had the chance to feed.

C. ***Clean Up*** - Birds will begin to die at the roost the morning following treatment. They should be picked up immediately by the custodial and field maintenance personnel and the area should be monitored frequently during the day to ensure all birds are picked up. Dead birds and any unused bait should be counted by species and properly disposed of in a hole, 3-6 feet deep in an inaccessible area. Soil binds up and detoxifies DRC-1339 quickly so that it is not considered an environmental hazard. At the conclusion of the baiting trial, the hole will need to be covered back over with dirt.

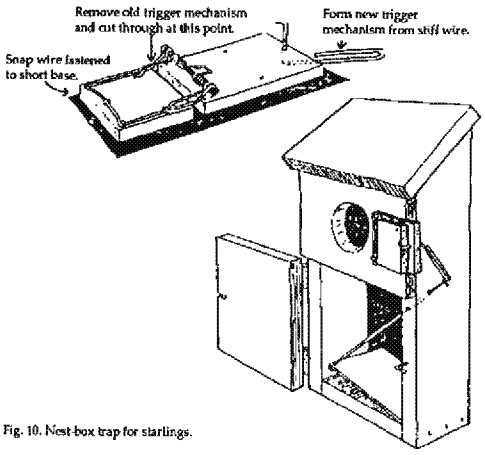


Fig. 10. Nest-box trap for starlings.

Figure 8. Nest-box trap for European starlings.

1. ***<u>European Starling Nests</u>*** – Starlings commonly nest in the cavities of man-made structures and trees and should be discouraged from doing so where applicable. Securely fasten quarter inch wire mesh over holes or entrances to exclude them from structures. If this is not feasible, nest box traps (Fig. 8) can be used to capture target birds by placing the trap near the cavity that starlings are using or are expected to use. Clean out the nests and hang the

trap near an active cavity. Inspect the trap frequently during the day, especially early in the nesting season which will commence around early to mid-March. Remove any trapped starlings and euthanize them with an acceptable and humane method such as cervical dislocation (breaking the neck) or the use of carbon dioxide gas (American Veterinary Medical Association 1993). If non-target species are caught, they should be freed immediately.

2. ***Decoy Traps*** - European starlings and blackbirds can be caught in decoy traps. The primary trap used is a modified Australian crow trap (Fig. 9). This trap can be set up on the airfield in areas where birds are feeding, loafing, and roosting. A 1.75-inch wide opening in the slot-board (Figure 8, part b) is recommended, whereas a 6 x 6-inch square opening should be used when targeting crows.

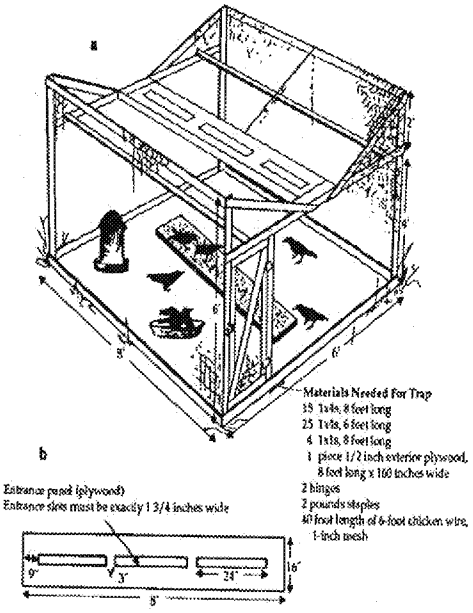
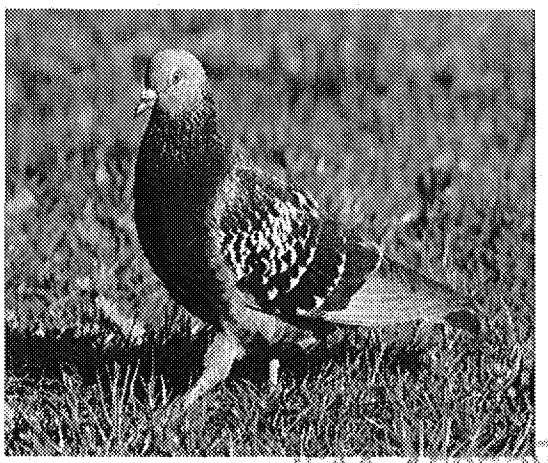


Figure 9. Instructions for constructing a modified Australian crow trap.

3. Traps should be pre-baited on the top of the trap with dry cat food (starlings) and sunflower seeds (blackbirds) for several weeks until there are signs of active feeding. Once this is accomplished, start baiting the inside of the trap with the door open to allow birds to acclimate to the inside of the trap. After several days, close the door with a supply of food and water and wait until a few birds are captured. Retain approximately 3-5 birds as live decoys to attract the remaining birds to go inside. Remove and euthanize excess birds and maintain fresh food and water daily as needed.

Consistent and proper use of this method can remove a significant percentage of the total population over a 2-3 year period of time. If non-targets are caught, they can be immediately released.

7.1.3 DOVES



Description - Doves are powerful fliers with a robust body, small head, and short beak. Rock doves (feral pigeons) were introduced from Europe and have spread across the U.S. into California. They tend to fly in flocks of 10-100 birds at higher altitudes, descending to their destinations in a rapid circling pattern with wings spread back. Mourning doves are also widespread throughout California and

typically fly in pairs or small groups of 3-10 birds close to the ground near cover as they travel between feeding and roosting areas. Although both species are primarily granivorous, they are also well-known for readily accepting handouts from humans.

General Abundance at LAX – Rock doves and mourning doves are common at LAX and utilize many of the structures on the airport property for loafing, roosting, and nesting. Rock doves were found at LAX throughout the year, which peaked in July with 46 and August with 35 (Fig. 10). Rock dove observations were the highest at Station 11 with 23 and Station 5 with 22 (Fig. 11) and were observed flying over Runways 25L/25R from El Segundo to reach terminal 6 and the limo/shuttle van staging lot to reach Station 5, which was adjacent to the approach end of Runways 24L/24R. Anti-perching devices were installed by Construction and Maintenance in January 2006 to reduce the number of rock doves perching on structures in the lot. Stations 4, 5, and 11 had the highest frequency of occurrence for rock doves during the survey period (Fig. 12). Frequencies are listed for the highest ranking Station #'s as follows: 1) Station 11 = 14%; 2) Station 5 = 7% and; 3) Station 4 = 6%.

Mourning doves were infrequently observed in the late winter and early spring peaking in June with 37, July with 20 and October with 26 (Fig. 13). Mourning dove observations were the highest at Station 9 with 57, Station 6 with 17 and Station 5 with 13 (Fig 14). In addition, mourning doves were not observed at Stations 11, 13, and 14.

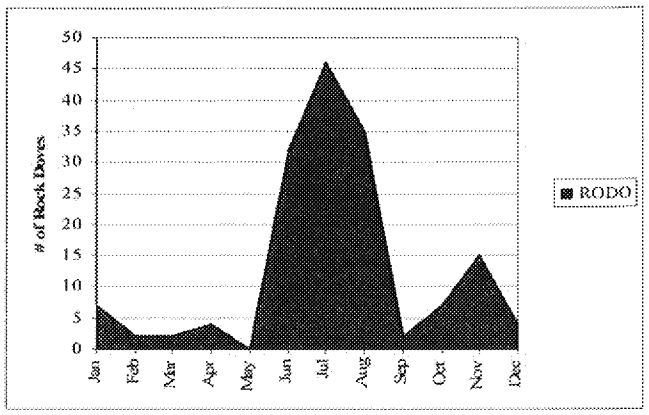


Figure 10. Total numbers of rock doves by month at LAX (April 2005 – March 2006).

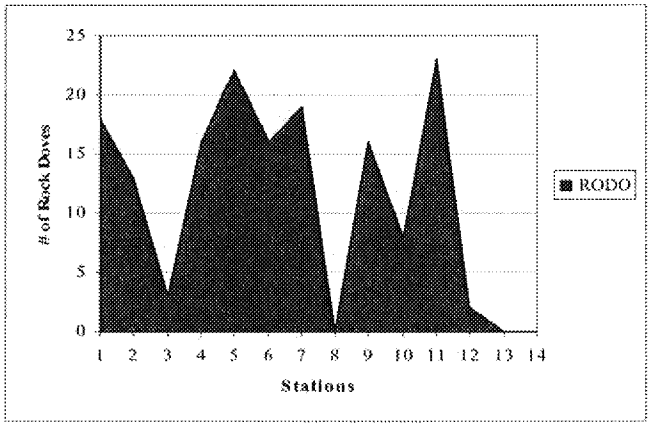


Figure 11. Total numbers of rock doves by station # at LAX (April 2005-March 2006).

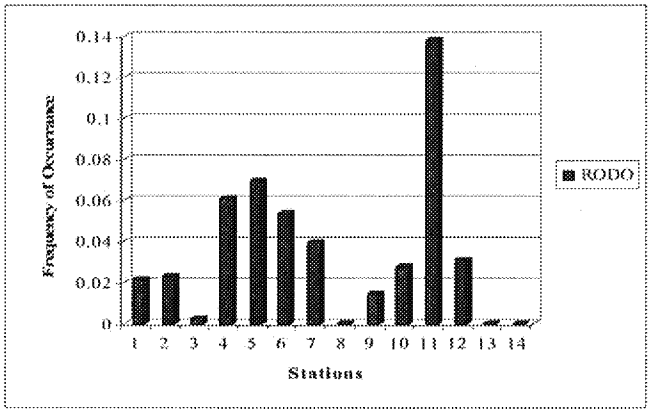


Figure 12. Frequency of European starling observations to all species combined by Station # at LAX (April 2005 -March 2006).

Attractants - Mourning doves and rock doves are common in agricultural areas, open grass fields, disturbed areas, and urban settings. Buildings often provide desirable nesting areas, e.g. A/C units and ventilation ducts. Decoy trapping and shooting resulted in the removal of 2,648 rock doves in 2004-2005, which significantly reduced the numbers of airfield dispersals in 2005/2006.

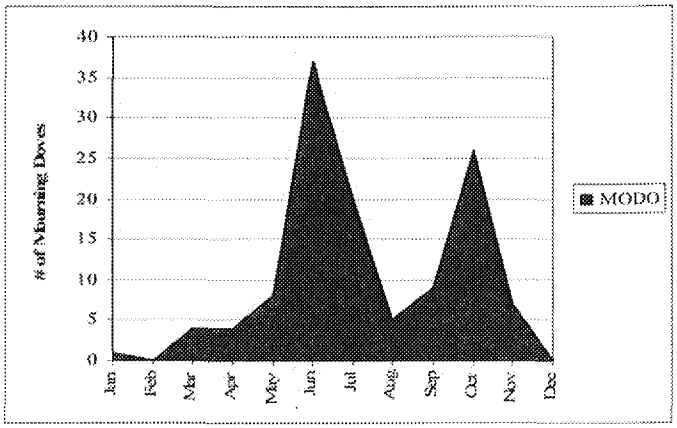


Figure 13. Total numbers of mourning doves by month at LAX (April 2005 – March 2006).

Damage - Although rock doves are not as large as many other species considered detrimental to air safety, e.g. waterfowl, gulls, and raptors, they are still a concern because of their loose flocking behavior, overall abundance, and dense body structure, all of which increases their potential to damage an aircraft. Rock dove droppings damage buildings and airplanes, which are corrosive to painted and metal surfaces and are vectors for several infectious diseases (McLean 1994) such as psittacosis, salmonella, and histoplasmosis (Appendix 12).

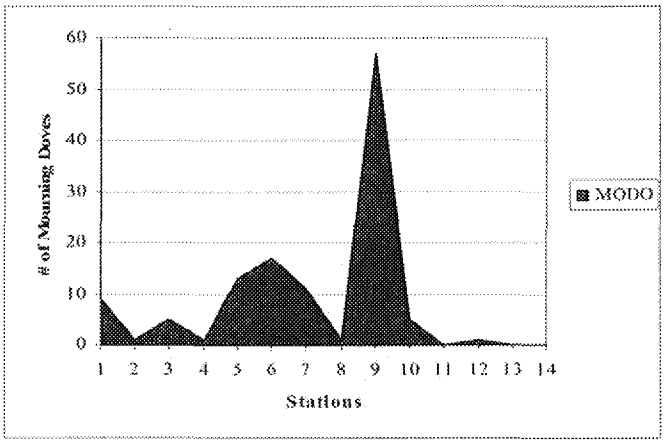


Figure 14. Total numbers of mourning doves by station # at LAX (April 2005 – March 2006).

Legal Status – Rock doves are not regulated by federal or state laws and can be taken at any time. Mourning doves, however, are migratory game birds and are regulated by Federal and State regulations and permits are required for lethal control activities.

Control Measures - Habitat modification, such as elimination of seed producing vegetation and the reduction of available water sources, will reduce the number of doves on the airfield. Building construction plans should include designs to prevent nesting by doves and other birds and pre-existing buildings should be retrofitted with exclusionary netting or types of barriers to block access to eaves and I-beams. Installation of wire slinky coils, porcupine wire, or some other tactile repellent, e.g. Tanglefoot™ or 4-the-birds™, can be applied to problem areas.

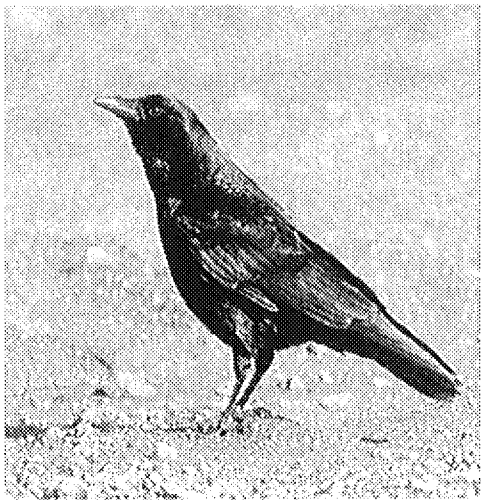
Rock doves can be effectively hazed and removed by shooting with a pneumatic air gun. Hazing birds with pyrotechnics and vehicle/shooting harassment are effective in areas where birds pose an immediate threat to aircraft safety. Although shooting does not reduce large numbers of birds on the airfield, it can be used to remove birds from hangars as well as other roosting and nesting

structures. Once a large percentage of birds have been removed from these sites, it is prudent to install exclusion barriers to prevent birds from re-colonizing the area.

Avitrol[7] (4-aminopyridine) (Appendix 11), a chemical frightening agent, is also available for rock doves, but it is not recommended for use near airports because the birds respond in unpredictable ways before they die, which could create a greater hazard to aircraft.

Decoy or walk-in traps that utilize a swinging door are very effective in removing a significant number of rock doves from buildings that are adjacent to the airfield and the outer perimeter of the airport. To set one, pre-bait a trap with scratch (mixture of cracked corn and millet) and/or bread in an area where birds are loafing and roosting. Capture a decoy and keep it inside the trap with enough feed and water and check the trap daily. Rotate the trap to new locations as necessary to maintain maximum catch rates. Euthanize captured birds by placing them inside a carbon dioxide chamber, especially large-scale projects, or cervical dislocation and dispose into a landfill.

7.1.4 CROWS AND RAVENS



Description - Crows and ravens are well-known, gregarious birds of exceptional intelligence. Crows and ravens are medium to large sized black birds that are omnivorous as they feed on a wide range of food items including vegetable and grain crops, insects, and refuse. Distribution patterns for the two species differ in elevation with the preference for crows to exist in lower and ravens in higher elevations. Since LAX is in close proximity to the ocean, crows are common in and immediately outside of the airfield environment.

General Abundance at LAX - American crows were observed at LAX throughout the year and their numbers peaked in September with 443, June with 297 and April with 283 (Fig. 15). American crow observations were highest at Station 7 with 301, Station 3 with 267 and Station 1 with 247, which comprised 45% of all stations combined (Fig. 16). Stations 1, 3 and 7 are located on the north side of LAX, which provides short grass for foraging and access to trees for loafing and nesting. Stations 4, 7, and 11 had the highest frequency of occurrence for American

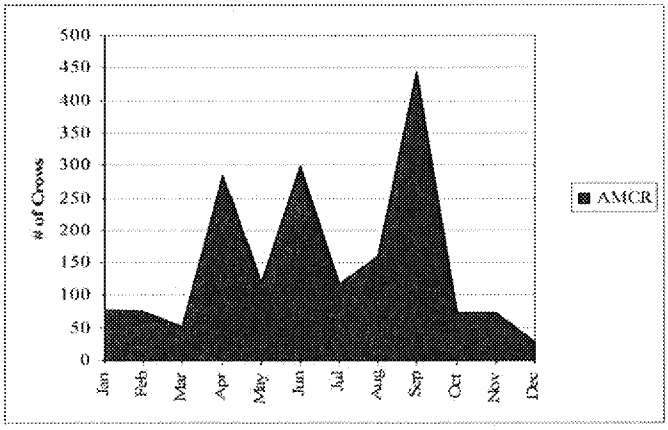


Figure 15. Total numbers of crows by month at LAX (April 2005 – March 2006).

crows during the survey period (Fig. 17). Frequencies are listed for the highest ranking Station #'s as follows: 1) Station 7 = 62%; 2) Station 11 = 50% and; 3) Station 4 = 44%.

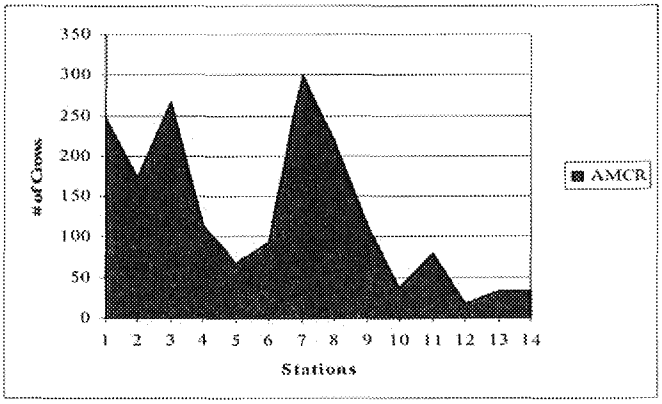


Figure 16. Total numbers of crows by station # at LAX (April 2005 – March 2006).

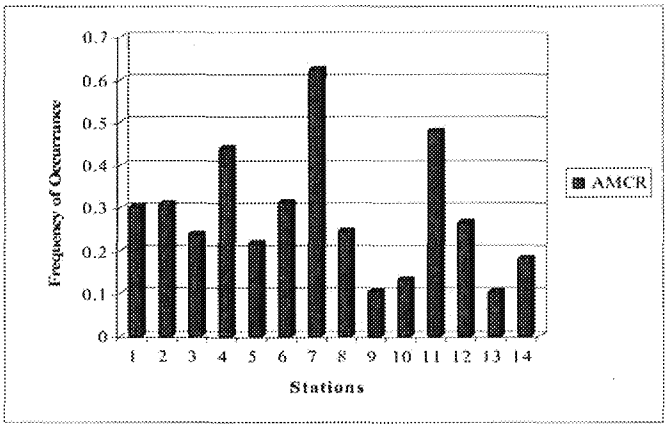


Figure 17. Frequency of crow observations to all species combined by Station # at LAX (April 2005 – March 2006).

Attractions – American crows and ravens prefer to feed in open areas, especially when there is dense cover nearby such as trees or shrubs. As opportunistic feeders, they will feed on a wide variety of foods to include fruits, nuts, bird hatchlings, lizards, insects, refuse, and carrion. Since mowing activities often attract large numbers crows and ravens into critical areas on the airfield, rapid response for dispersal by Operations would greatly reduce the potential for bird air strikes.

Damage – American crows and ravens are medium to large-sized birds and can inflict severe damage to aircraft. A recent observation at LAX revealed that a flock of crows disregarded an aircraft on take-off while they were in the act of harassing a red-tailed hawk from the runway environment. Fortunately, the aircraft was able to take off after one crow struck the engine cover. Crows also comprise approximately 1% of the total strikes reported in the United States (Cleary et al. 2005).

Legal Status – American crows and ravens are migratory nongame birds and afforded protection under the Migratory Bird Act. However, crows, and blackbirds, i.e., Brewer's and red-winged, can be taken without a Federal permit when they are found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance... (50CFR Ch. I ' 21.44). The State of California recognizes the Federal regulations and does not require a state permit under the conditions previously mentioned.

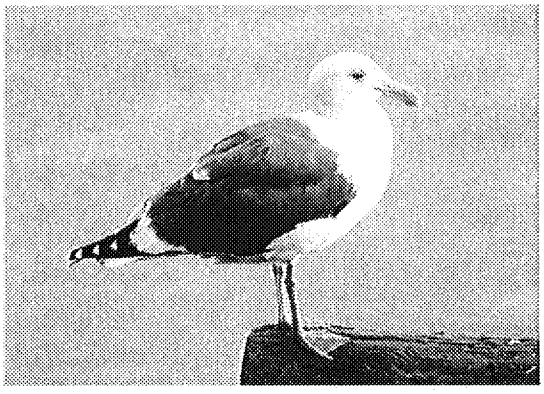
Control Measures - Habitat modifications are helpful in reducing the numbers of crows and ravens on an airfield. This is most effectively accomplished through prey-base reduction and the removal of dense tree stands, refuse, and carrion from runways. Activities such as mowing or irrigation may be an attractant and should therefore be carefully managed or eliminated. Crows and ravens can easily be hazed using pyrotechnics, bioacoustics, and visual repellents, but soon

habituate to these devices if not enhanced by lethal control. Pyrotechnics are especially effective when supplemented with shooting. Shooting with a pellet gun or shotgun can be useful in removing low to moderate numbers of crows and ravens from an airfield.

1. ***Roost Control*** - If a roost forms on or near the airport, it can be removed by thinning the trees and/or hazing with pyrotechnics, bioacoustics, and free floating helium-filled balloons. In addition, a few should be shot for reinforcement. If a hazing effort is conducted, it needs to be done intensively until the roost disperses, usually for 3-4 days. Birds may not return, but if they do, the process should be repeated immediately upon their return.

2. ***Australian Crow Trap*** - This decoy trap can be modified for starlings and blackbirds, except the entrance slots are 6 x 6-inch openings (Fig. 9). The traps should be pre-baited with canned or dry dog food until the first few individuals are caught, which can then be used as decoys. The decoys should be left in the trap with an adequate supply of food and water to act as decoys for attracting other birds.

7.1.5 WESTERN GULLS



Description – Western gulls are medium-sized seabirds with webbed feet, long pointed wings, and a stout, slightly-hooked bill. Most adult gulls are white with gray backs and black wing tips, whereas juveniles are typically a mottled brown color with black bills for the first 2 to 3 years.

General Abundance at LAX - While other gull species are periodically observed in Los Angeles County, the Western gull was the only species observed on the airfield at LAX during the survey period. The highest numbers of observations occurred in January with 59, February with 33, and May with 17 (Fig. 18). Gull observations were highest at Station 13 with 38, Station 14 with 27, and Station 11 with 21, which comprised 52% of all stations combined (Fig. 19). Gulls were often observed flying near terminals and cargo buildings in search of handouts. Station numbers 11, 12, and 14 had the highest frequency for gulls during the survey period. Frequencies are listed for the highest ranking stations as follows: 1) Station 12 = 20%; 2) Station 14 = 14% and; 3) Station 11 = 13% (Fig. 20).

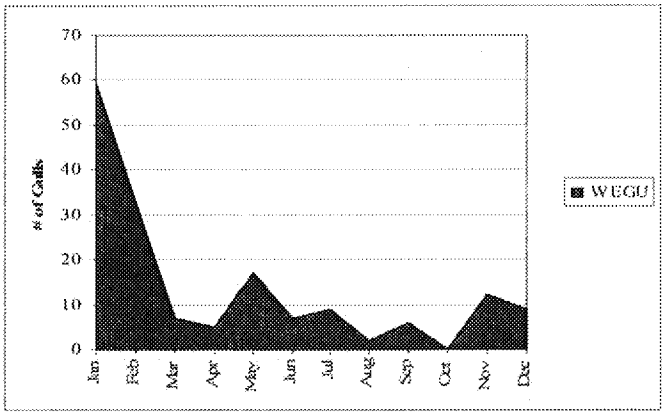


Figure 18. Total numbers of gulls by month at LAX (April 2005 – March 2006).

Attractants - Gulls are attracted to temporary standing water and food, which includes refuse from dumpsters and landfills, handouts, earthworms, insects, and carrion. Successful mitigation of gull activity at LAX requires the removal of food sources and perching sites within and immediately outside of the airfield.

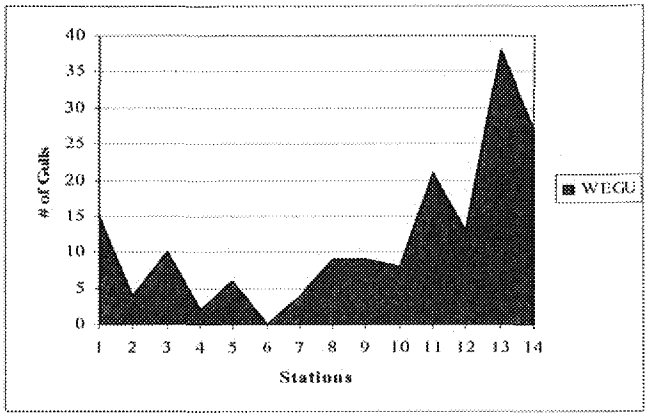


Figure 19. Total numbers of gulls by station # at LAX (April 2005 – March 2006).

Damage - Gulls are considered a primary hazard because of their size, abundance, wide distribution, flocking behavior, relatively slow flight characteristics, and general tendency to concentrate at airports. Unfortunately, there has been reported damage to aircraft components as a result of a gull strike at LAX in 2005. Since 1990, 72 gulls have been struck by aircraft at LAX (Cleary, et al, 2005).

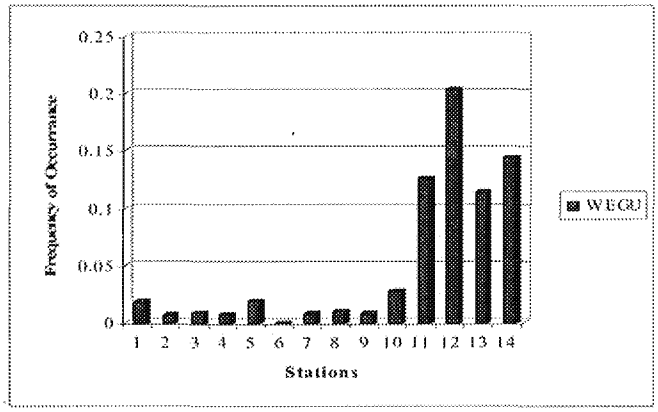
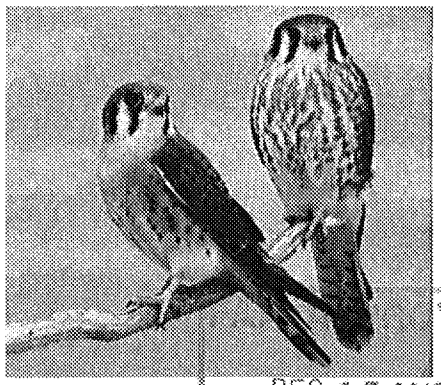


Figure 20. Frequency of gull observations to all species combined by Station # at LAX (April 2005 – March 2006).

Legal Status - Gulls are classified as migratory nongame birds and can be controlled with a USFWS depredation permit.

Control – The removal of refuse, carrion, tall grasses, standing water, i.e., drainage improvements, are recommended habitat modifications to reduce gull activity on the airfield. Gulls can be excluded from building ledges and bodies of water by covering the surfaces with exclusion barriers and the installation and enforcement of "do not feed the birds" signs. Since gulls habituate rather quickly to pyrotechnics, bioacoustics and visual scare devices, effigies can be used to reinforce the nonlethal techniques. In addition, dispersal efforts tend to improve when shooting is used as the primary method of lethal control (Dolbeer et al. 1993).

7.1.6 HAWKS AND FALCONS



Description - Raptors are predatory birds and scavengers that possess hooked beaks and talons to capture and feed on prey. Raptors include vultures, eagles, hawks, osprey, kites, harriers, accipiters, buteos, falcons, and owls. Raptors range in size from as small as the 8-inch long American kestrel to as large as the 36-inch long golden eagle. Most species have

characteristic hunting styles such as soaring (vultures, eagles, red-tailed hawks), low-flying (harriers) and dense forest (accipiters) ambush, hovering (white-tailed kite and kestrel), and watching from perches (buteos and owls).

General Abundance at LAX - American kestrels, burrowing owls, Cooper's hawks, peregrine falcons, and red-tailed hawks were observed on LAX. American kestrels were the most abundant raptor species observed at LAX with a total of 467. The highest numbers of observations occurred in July with 93, October with 60, and November with 55 (Fig. 21). Kestrel observations were highest at Station 14 with 95, Station 1 with 86 and Station 13 with 80, which comprised 56% of all stations combined (Fig. 22). Kestrels were often observed feeding on grasshoppers in open grass areas, resting on glide scopes and runway signs, and roosting in trees northwest of the Argo Ditch. Red-tailed hawks were the next abundant raptor species observed at LAX with 110. The highest number of observations occurred in January with 18, February with 13 and November with 13, which comprised 40% of all months combined (Fig. 23). Red-tailed hawks were often observed perching on glide scopes and runway markers with 34% on the north complex and 66% on the south complex.

Attractants - Available prey, open spaces, roosting, and perching structures provide ideal habitat for most raptors. The open grassland areas surrounding the north and south runway complexes of LAX support a variety of prey items for raptors to include, insects for American kestrels and burrowing owls, mice, pocket gophers and ground squirrels for hawks, falcons, kites,

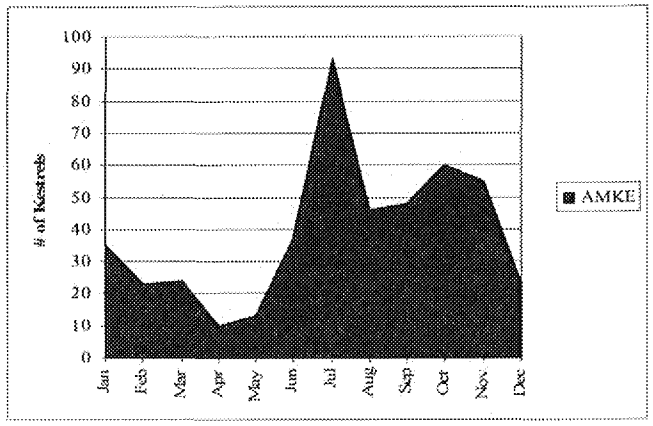


Figure 21. Total numbers of kestrels by month at LAX (April 2005 – March 2006).

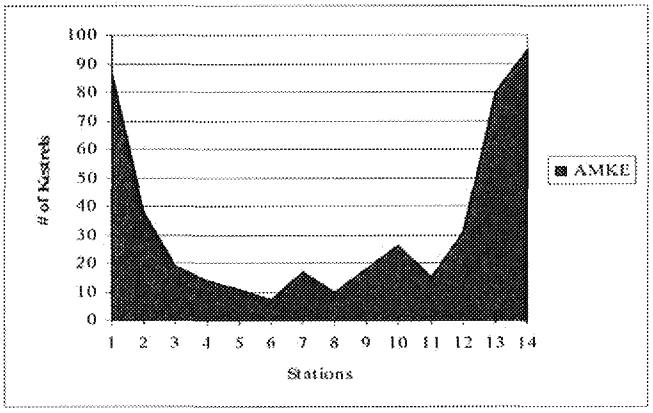


Figure 22. Total numbers of kestrels by station # at LAX (April 2005 – March 2006).

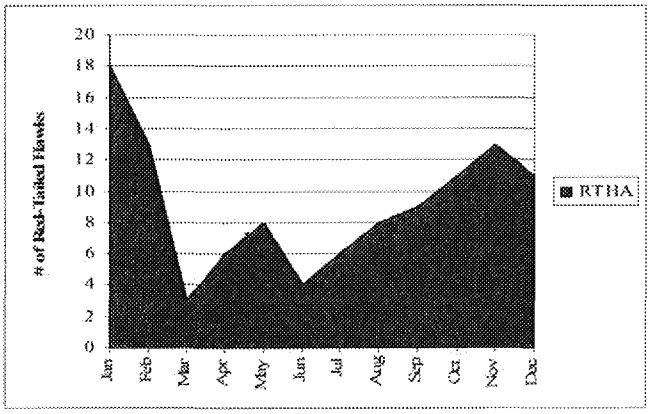


Figure 23. Total numbers of red-tailed hawks by month at LAX (April 2005 – March 2006).

owls, and small birds for Cooper's hawks.

Damage - Raptors represent a significant hazard to aircraft because they are typically large in size and because their hunting and soaring behavior increases the likelihood of collisions with aircraft. Unfortunately, there has been reported damage to engine turbines as a result of red-tailed hawk strikes at LAX.

Legal Status - Raptors are protected as nongame migratory birds. Eagles, specifically, are protected under their own Act and require an additional permit to harass or take. The bald eagle, peregrine falcon, and ferruginous hawk are afforded varying degrees of protection under state and/or Federal laws (see Appendix 2 for a listing of current status) and the respective regulating agencies (Appendix 6) should be consulted prior to implementing any control action that may affect them. Wildlife control personnel should be aware of these species and avoid potential impacts to them. Other species such as the golden eagle, northern goshawk, merlin, flammulated owl, and burrowing owl (Appendix 2) are species of special concern and/or candidates for the State or Federal endangered species list and should be avoided. This list should be reviewed and updated at least once per year pending and change in status.

Control Measures - Habitat modifications, specifically vegetation, structure, and prey-base management, will have profound effects on the number of raptors. If raptors still persist to remain on the airfield, hazing (pyrotechnics) can be used to deter birds. The most non-respondent individuals may have to be trapped or shot. Raptors can be captured using several styles of traps including bal-chatri, padded-jaw leghold, and Swedish goshawk. Most of these can be used to take and relocate specific individuals. If a hawk becomes trap shy, it may have to be shot if it poses a significant risk to air traffic. The appropriate permit must be obtained prior to control since many raptors are sensitive species.

1. Bal-Chatri Trap - These traps are relatively small and are shaped into a semi-cylindrical form (Fig. 24). They can be modified to trap specific types of raptors. Live bait is used to lure raptors and nylon nooses entangle their feet, holding the birds. Traps are made of 1" chicken wire (½" mesh hardware cloth if mice are used for bait), formed into Quonset-huts, 18" long, 10" wide, and 7" high. Floors are 1" wire mesh or smaller, depending on bait. Tops are covered with about 80 nooses of 40# test monofilament line (Fig. 24). Traps should be anchored to the ground to prevent birds from dragging them off or breaking the nooses and baited with live rodents for the best attractant. Once a trap has been set, it is important to monitor it within 15-30 minutes.

Figure 24. Bal-Chatri trap and monofilament noose assembly.

2. Padded-Jaw Leghold Trap – Problem raptors can be caught with sliding padded pole traps (Fig. 25). Erect 5-10 foot poles near areas where hawks frequent and place modified # 1 coil spring traps on top of the poles; it is suggested that one of the coil springs be removed and a small perch be mounted to the pan that does not interfere with closing. Jaws must be padded with foam rubber, wrapped by electrician's tape. Run a 12-gauge steel wire through the trap-chain ring and staple it to the top and bottom of the post. This allows a trap to slide to the ground where

the bird can safely rest. An anchor of light gauge wire can be used on the opposite side to give the trap stability, but should remain loose so the trap falls to the ground.

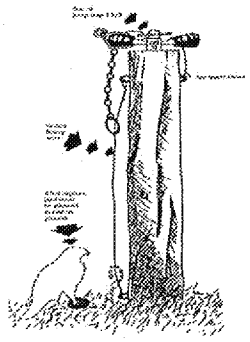


Figure 25. Padded-jaw leghold trap and pole assembly.

3. Swedish Goshawk Trap - These are relatively large traps that can be used to capture all types of perching raptors (Fig. 26). They consist of 3'x3'x1' bait cages made of 1" wire mesh with traps mounted on top that consist of wooden A-frames, nylon net panels, and a trigger mechanism. The trigger mechanism is a hinged stick that snugly fits between the panels and collapses when a raptor lands on it. Pigeons, starlings, rats and mice can be used as bait, but the bait cage needs smaller wire mesh for mice.

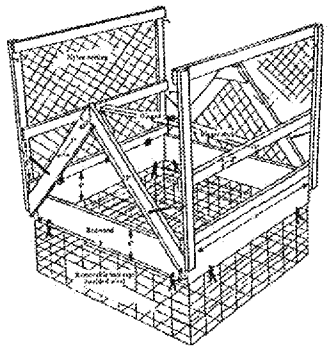
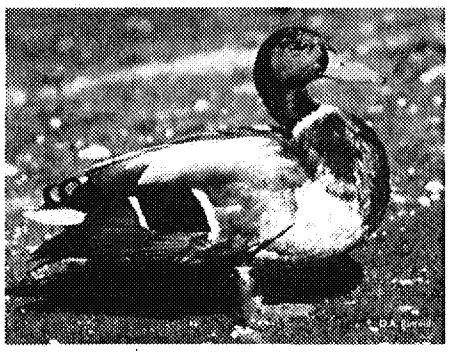


Figure 26. Swedish goshawk trap.

7.1.7 WATERFOWL (DUCKS, GEESE, AND SWANS)

Description - Waterfowl are aquatic birds with webbed feet, flattened bills, narrow pointed wings, and short legs. This guild includes ducks, geese, and swans. Ducks are classified as divers or dabblers, i.e., surface feeders. Coots are generally included in the same guild as other waterfowl and appear slate black with a short tail and wings, lobed feet, and a white beak with a black band near the tip. Since waterfowl are large birds and generally fly in tightly grouped flocks, they have the potential to cause severe damage to aircraft components.



General Abundance at LAX – A low number of ducks were observed during the survey period at LAX, which included 41 mallards and 7 hooded mergansers. Waterfowl were observed flying over or feeding in the Argo Ditch on the north side of the airport. The ditch provides cover and water to waterfowl, which illustrates the need to keep the ditch drained and free of vegetation.

Attractants - Waterfowl are attracted to temporary and small water bodies to feed, nest, loaf, and escape predators. Geese, swans, and to a lesser extent, ducks and coots, will frequent open grass fields, parks and golf courses to graze. Other waterfowl species, especially the diving ducks, are attracted to open water where they feed on fish and submerged aquatic vegetation.

Damage - Waterfowl can be particularly hazardous to aircraft because of their size and weight, flocking behavior, and relative abundance. As discussed in the introduction, the potential for

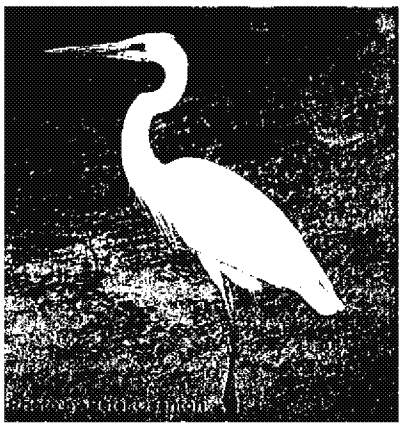
damage by waterfowl was most tragically illustrated in September 1995 when an Air Force jet crashed in Alaska after striking a flock of Canada geese on takeoff, killing all 24 crew members.

Legal Status - Waterfowl are protected as migratory game birds by federal and state laws, but most can be hunted during established hunting seasons. Hunting dramatically increases the effectiveness of non-lethal hazing techniques, but as discussed in the section on doves, there are several constraints that limit the feasibility of hunting as a viable control technique. A Federal depredation permit will need to be obtained if waterfowl are to be removed, which the state has historically recognized the Federal permit as adequate.

Control Measures - The best method of control for waterfowl is the removal or exclusion of attractive wetland habitat. Wire grids are effective at 10-20 foot intervals over ponds and other wetlands. Mylar tape stretched between 2 stakes, 50-100 feet apart at 25 foot intervals are effective for feeding areas. Pyrotechnics work well for most waterfowl, especially during the hunting season. If they habituate to hazing efforts, it may become necessary to shoot a few individuals to reinforce these methods. Habituation to hazing techniques is most often noticeable with resident birds, but may also occur in migrants a few weeks after the regular hunting season closes. Waterfowl are also affected by the use of visual repellents in conjunction with pyrotechnics. A coyote effigy can be an effective deterrent for keeping waterfowl from feeding areas, especially if the birds are migrants just passing through.

In addition to implementing direct control actions, pilots and ground personnel responsible for reducing wildlife hazards should be made aware of potential hazards at LAX, especially during the fall and winter months when waterfowl are plentiful. The issuance of a NOTAM (and possibly an ATISS) would be an effective way to disseminate this information to pilots.

7.1.8 WADING BIRDS (EGRETS AND HERONS)



Description – Wading birds are tall and long-necked birds with wide wingspans, which include egrets and herons. Egrets and herons have long beaks used to catch aquatic organisms, small rodents and lizards from wetland to dry grassland habitats. Adults migrate to nest in trees near watersheds called rookeries. Since wading birds have large wingspans and generally fly in pairs or small groups, they have the potential to cause severe damage to aircraft components.

General Abundance at LAX – A low number of wading birds were observed during the survey period at LAX, which included 13 great blue herons, 5 green-backed herons, and 3 great egrets. Wading birds were observed flying over or feeding in the Argo Ditch on the north side of the airport and open grass areas on the northwest and southwest sides of the airfield. The ditch provides food, cover and water to wading birds, which illustrates the need to keep the ditch drained and free of vegetation.

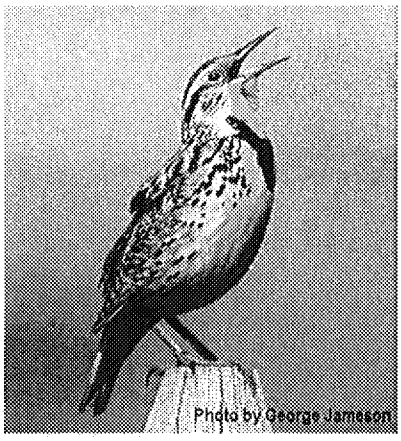
Attractants – Wading birds are attracted to temporary and small water bodies to feed on aquatic organisms and open grassland areas to feed on rodents and lizards.

Damage – Wading birds have caused damage to aircraft in other regions of the U.S. and fortunately, no damages to aircraft have been reported at LAX.

Legal Status – Wading birds are protected as migratory game birds by federal and state laws. A Federal depredation permit will need to be obtained if egrets and herons are to be removed, which the state has historically recognized the Federal permit as adequate.

Control Measures – Wading birds typically respond to the same measures listed under waterfowl.

7.1.9 WESTERN MEADOWLARKS



Description - Western meadowlarks are characterized with a light brown camouflaged back and distinctive bright yellow throat and breast, a black V below the throat, and white outer tail feathers.

General Abundance at LAX - Western meadowlarks and horned larks are common grassland species in Los Angeles County. Horned larks are common in the higher elevations, e.g., Palmdale Airport, whereas meadowlarks tend to be more abundant in the lower elevation at LAX. Meadowlarks were not observed at LAX from May – August and were most abundant from December - February. The highest numbers of observations occurred in January with 461, February with 440, and December with 360 (Fig. 27). Meadowlark observations were highest at Station 1 with 402, Station 3 with 310 and Station 2 with 289, which comprised 50% of all stations combined (Fig. 28). Meadowlarks were most commonly observed on the north side of the airfield, which provided undisturbed, short grass to feed on seeds and insects. Meadowlarks were not observed at Stations 11 and 12, since the vegetation is too sparse for food and cover. Station numbers 1, 2, and 4 had the highest frequency for meadowlarks during the survey period. Frequencies are listed for the highest ranking stations as follows: 1)

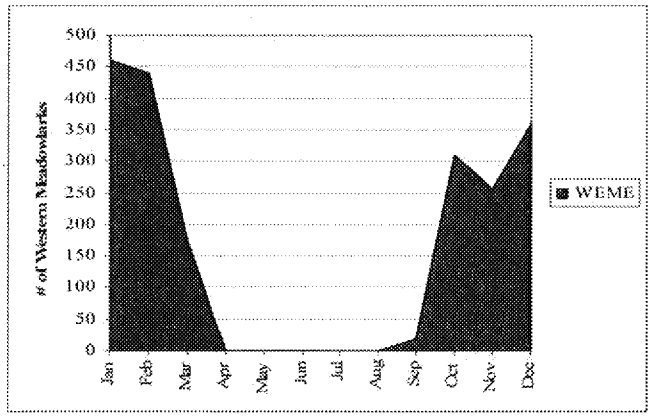


Figure 27. Total numbers of meadowlarks by month at LAX (April 2005 – March 2006).

Station 4 = 72%; 2) Station 2 = 51% and; 3) Station 1 = 49% (Fig. 29). Meadowlarks pose a potential threat to aviation safety and where observed crossing Runway 24R on several occasions and were included in the Aviation Crossing survey.

Attractants - Meadowlarks are attracted to short grass and agricultural fields where seeds and insects are abundant. Although they tend to forage at ground level, meadowlarks will usually perch above ground on trees, shrubs, high tension wires, and fences.

Damage - Meadowlark flocks aggregate on airfields during the winter migration to forage alongside and in-between the runways. Since large numbers of meadowlarks fly over the runways to reach open grass areas to forage, they are occasionally struck by aircraft.

Legal Status - Larks are migratory nongame birds and require a USFWS permit for lethal take.

Control Measures - Pyrotechnics and shooting harassment is partially effective in moving them from one area to another. Unfortunately, there are times when harassment directs the flock into hazardous areas or will fly in unpredictable directions. Visual repellents, especially raptor kites, helium balloons, and stretched mylar tape can also be used. WS has had limited success in the use of mist nets at other airports to capture birds flying inside critical zones of the airfield.

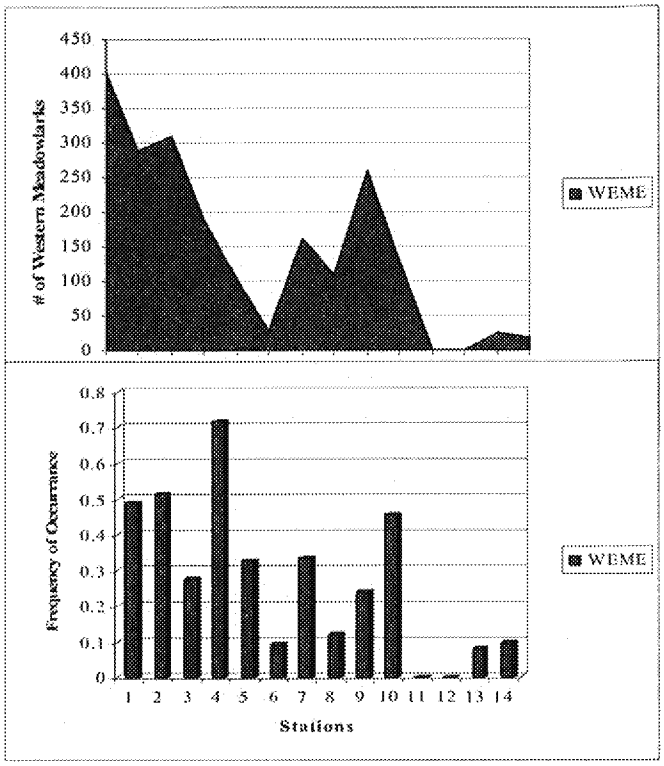


Figure 29. Frequency of meadowlark observations to all species combined by Station # at LAX (April 2005 – March 2006).

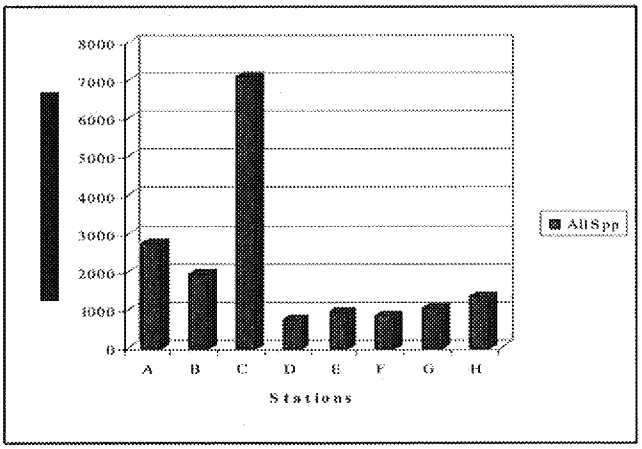


Figure 30. Summary totals of all species combined at Off-Airport Stations at LAX (April 2005 – March 2006).

7.2 OFF-AIRPORT BIRD SURVEYS

Off-airport surveys consisted of spot observations at Stations A-H in areas surrounding the airport, which were selected on proximity to the airport and attractive potential to wildlife posing a threat to aircraft safety.

A total of 11,837 (29 species) birds were observed at Stations A-H (Fig. 30) and the average flock size was 4.3 birds. The most abundant species observed included: 1) Western gull = 7,671 or 46%; 2) rock dove = 3,920 or 24%; 3) European starling = 2,942 or 18%; 4) American crow = 776 or 5%. The top four species comprised 92% of all birds observed on off-airport sites.

7.2.1 STATION A

Waterview Street runs parallel and north of the LAX dunes, which allows for the observation of birds loafing and feeding in the area. The habitat boarders a residential area and is primarily short grass with a few trees and shrubs interspersed throughout the quarter mile radius. Residents were observed feeding birds in the vicinity of the gate. During the survey period, a total of 389 observations = 2,725 birds (Table 3). Seventeen species of birds were observed at Station A, which included: 1) rock doves = 1,740 or 64%; 2) European starlings 586 or 22% and; 3) American crows = 125 or 5%. The top three species comprised 91% of the total number of birds observed at Station A.

Table 3. Station A bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[4]	*Range*
A. Waterview Street				
American Crow	58	125	4	1-8
American kestrel	30	46	1.5	1-4
Brewer's Blackbird	2	41	20.5	15-26
European Starling	61	586	8.1	1-75
Great Blue Heron	1	1	1	1
House Finch	3	6	2	1-3
House Sparrow	7	14	2	1-5
Mourning Dove	41	82	2	1-11
Northern Mockingbird	17	22	1.3	1-4
Rock Dove	104	1,740	16.7	1-179
Red-Tailed Hawk	7	7	1	1-1
Say's Phoebe	8	9	1.1	1-2
Western Gull	14	28	2	1-6
Western Kingbird	4	14	3.5	1-11
Western Meadowlark	1	3	3	3
White-Tailed Kite	1	1	1	1

7.2.2 STATION B

Vista Del Mar Park is located 0.45 miles from LAX and has picnic tables, palm trees, lawn, and open trash cans, which provides foraging, loafing, and roosting opportunities for a number of birds. Dockweiler Beach is immediately west of the park where a significant number of rock doves were observed roosting and nesting in an abandoned directly across the street from the park. During the survey period, a total of 323 observations = 1,940 birds (Table 4). Ten species of birds were observed at Station B, which included: 1) rock doves = 902 or 46%; 2) Western gulls = 768 or 40%; 3) European starlings = 97 or 5%, and; 4) American crow = 78 or 4%. The top four species comprised 95% of the total number of birds observed at Station B.

Table 4. Station B bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[4]	*Range*
B. Vista Del Mar Park				
American Crow	41	78	1.9	1-10
American kestrel	5	6	1.2	1-2
Brown Pelican	22	71	3.2	1-21
European Starling	31	97	3.1	1-15
Great Egret	1	1	1	1
Northern Mockingbird	1	1	1	1
Pelagic Cormorant	2	9	4.5	1-8
Rock Dove	130	902	6.9	1-65
Western Gull	89	768	8.6	1-140
Whimbrel	1	7	7	7

7.2.3 STATION C

Hyperion Wastewater Treatment Plant (HWTP) is located adjacent to the southwest corner of LAX on Imperial Highway and immediately east of Dockweiler Beach. This treatment plant contains a number of circular 150ft diameter uncovered clarifying tanks that attract gulls and other species of birds. Dockweiler Beach attracts a variety of seabirds that were observed loafing and foraging on the beach and surf for invertebrates and fish. In addition, terrestrial birds were observed foraging on the sand, especially during the peak summer months for handouts. During the survey period, a total of 396 observations = 7,091 birds (Table 5). Eleven species of birds were observed at Station C, which included: 1) Western gulls = 6,598 or 93%; 2) rock doves = 198 or 3%; 3) American crows = 91 or 1% and; 4) Common terns = 75 or 1%. The top four species comprised 98% of the total number of birds observed at Station C.

Table 5. Station C bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[4]	*Range*
C. HWTP				
American Crow	48	91	1.9	1-9
Brown Pelican	13	51	3.9	1-8
Barn Swallow	1	1	1	1
Common Tern	1	75	75	75
Cliff Swallow	1	2	2	2
European Starling	17	65	3.8	1-30
Long-Billed Dowitcher	1	1	1	1
Pelagic Cormorant	2	2	1	1
Rock Dove	67	198	2.6	1-12
Western Gull	244	6598	27	1-350
Whimbrel	1	7	7	7

7.2.4 STATION D

Long-term and employee parking Lots B and E are located on the southeast end of the airport and are located and adjacent to the approach pathway of runways 25L/25R. The lots are flanked by an empty airport lot to the south and an open grass ILS area to the north. The Proud Bird restaurant and La Cienega Blvd are immediately west and east of the parking lots respectively. Tenants have been observed leaving handouts in the parking lot, which attracts a number of crows, gulls, rock doves, sparrows, and starlings. In addition, there are a significant number of utility lights in the lots, which provide an excellent vantage point for foraging and loafing birds. In 2005, an approaching aircraft struck a number of gulls on approach to runway 25L, resulting in significant damage to the wing flap. Decoy trapping removed a significant number of rock doves from 2003-2006 in addition to the enforcement of the "do not feed the birds policy" by Landside Operations. During the survey period, a total of 267 observations = 735 birds (Table 6). Ten species of birds were observed at Station D, which included: 1) European starlings = 336 or 46%; 2) rock doves = 177 or 24%; 3) house sparrows 108 or 15% and; 4) American crows = 63 or 9%. The top four species comprised 93% of the total number of birds observed at Station D.

Table 6. Station D bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[4]	*Range*
D. Lots B & E				
American Crow	47	63	1.3	1-4
Cliff Swallow	1	1	1	1
European Starling	80	336	4.2	1-47
House Sparrow	43	108	2.5	1-12
Loggerhead Shrike	1	1	1	1
Mourning Dove	2	4	1.4	1-3
Rock Dove	69	177	2.6	1-11
Say's Phoebe	2	2	1	1
Western Gull	21	34	1.6	1-7
Western Meadowlark	1	9	9	9

7.2.5 STATION E

The shuttle van, limousine, tour bus, and taxi staging lot are located approximately 0.30 miles from the approach end of runways 24L/24R. This is an area of great concern due to a food distribution truck that is parked in the lot 24/7 and observations of birds being fed. Since 2005-2006, utility lights have been covered with anti-perching devices, i.e., bird spikes and daddi longlegs™ and a significant number of rock doves were removed with decoy traps inside the FAA ILS area adjacent north of the lot. During the survey period, a total of 284 observations = 953 birds (Table 7). Seven species of birds were observed at Station E, which included: 1) rock doves = 531 or 56%; 2) House sparrows = 182 or 19%; 3) American crows = 102 or 11% and; 4) European starlings = 96 or 10%. The top four species comprised 96% of the total number of birds observed at Station E.

Table 7. Station E bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[4]	*Range*
E. Staging Lot				
American Crow	64	102	1.6	1-5
European Starling	17	96	5.6	1-75
House Sparrow	55	182	3.3	1-15
Mourning Dove	1	1	1	1
Rock Dove	119	531	4.5	1-33
Say's Phoebe	1	1	1	1
Western Gull	27	40	1.5	1-4

7.2.6 STATION F

Station F is inside the ILS area east of Aviation Blvd. and west of La Cienega Blvd., and east of the approach end of runways 25L/25R. Warehouses and employee parking lots B and E flank the north and south side of the area respectively. The area is primarily open grassland with large ILS structures for perching by raptors. During the survey period, a total of 154 observations = 827 birds (Table 8). Sixteen species of birds were observed at Station F, which included: 1) European starlings = 361 or 44%; 2) rock doves = 132 or 16%; 3) cliff swallows = 27 or 3% and; 4) house finches = 27 or 3%. The top four species comprised 66% of the total number of birds observed at Station F.

Table 8. Station F bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[4]	*Range*
F. ILS East				
American Crow	8	19	2.4	1-9
American kestrel	15	15	1	1
Barn Swallow	2	2	1	1
Cliff Swallow	9	27	3	1-5
European Starling	39	361	9.3	1-50
House Finch	4	27	6.8	1-13
House Sparrow	8	21	2.6	1-4
Loggerhead Shrike	2	2	1	1
Mourning Dove	12	26	2.2	1-5
Northern Mockingbird	6	6	1	1
Rock Dove	13	132	10.2	1-41
Red-Tailed Hawk	7	7	1	1
Say's Phoebe	17	20	1.2	1-2
Western Gull	1	1	1	1
Western Meadowlark	10	157	15.7	1-52
White-Crowned Sparrow	1	4	4	4

7.2.7 STATION G

Station G is located on the rooftop parking structure of Southwest and British Air Cargo, which is northeast of runway 25R. A number of birds use the area and cargo buildings for foraging, loafing, roosting, and nesting. Gulls and starlings were observed loafing on billboards and utility lights in the area and mourning doves and starlings were observed flying inside the cargo building to roost and nest. During the survey period, a total of 198 observations = 1,015 birds (Table 9). Eight species of birds were observed at Station G, which included: 1) European starlings = 765 or 75%; 2) rock doves = 86 or 8%; 3) Western gulls = 76 or 7% and; 4) American

crows = 64 or 6%. The top four species comprised 98% of the total number of birds observed at Station G.

Table 9. Station G bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[1]	*Range*
G. SWA/BA Cargo Bld.				
American Crow	45	64	1.4	1-5
American kestrel	1	1	1	1
European Starling	74	765	10.3	1-115
House Sparrow	1	1	1	1
Mourning Dove	18	20	1.1	1-2
Rock Dove	14	86	6.1	1-52
Say's Phoebe	1	2	2	2
Western Gull	44	76	1.7	1-17

7.2.8 STATION H

The Westchester Recreation Center (WRC) is located at the intersection of Lincoln Blvd. and Manchester Ave north of LAX and provides a number of building structures, large trees, parking lot, and lawn areas for birds to forage and loaf. During the survey period, a total of 257 observations = 1,336 birds (Table 10). Eleven species of birds were observed at Station H, which included: 1) European starlings = 636 or 48%; 2) American crows = 233 or 17%; 3) rock doves = 154 or 12% and; 4) Brewer's blackbirds = 132 or 10%. The top four species comprised 86% of the total number of birds observed at Station H.

Table 10. Station H bird observation summaries.

Species	*# Obs*	*# Birds*	*Mean Flock Size*[1]	*Range*
H. WRC				
American Crow	95	233	2.5	1-19
American kestrel	1	1	1	1
Brewer's Blackbird	11	132	12	1-35
European Starling	51	636	12.5	1-250
House Finch	4	16	4	1-7
House Sparrow	12	30	2.5	1-9
Mallard	3	4	1.3	1-2
Mourning Dove	1	1	1	1
Rock Dove	25	154	6.2	1-22
Say's Phoebe	3	3	1	1
Western Gull	51	126	2.5	1-14

7.3 DUNES

The 302-acre dune is located between LAX and the Pacific Ocean. This land was acquired by the City of Los Angeles, Department of Airports to avoid exposing residents to unhealthy levels of noise. The city cleared 822 residences from the dunes between 1966 and 1972 and roughly 200 acres of the dune is currently protected coastal habitat for the Federally Endangered El Segundo Blue Butterfly.

7.4 MAMMALS

Description – The mammals of LAX primarily consist of feral cat, opossum, raccoon, red fox, skunk, large rodents to include fox and ground squirrels, and small rodents to include mice and pocket gophers. Smaller mammals, e.g., gophers and squirrels, pose indirect threats to aircraft safety by attracting predators into the airfield environment. Larger mammals, e.g., coyote and fox, and birds of prey, e.g., hawks and herons, forage for rodents near the runways, which significantly increases the potential for wildlife strikes to occur.

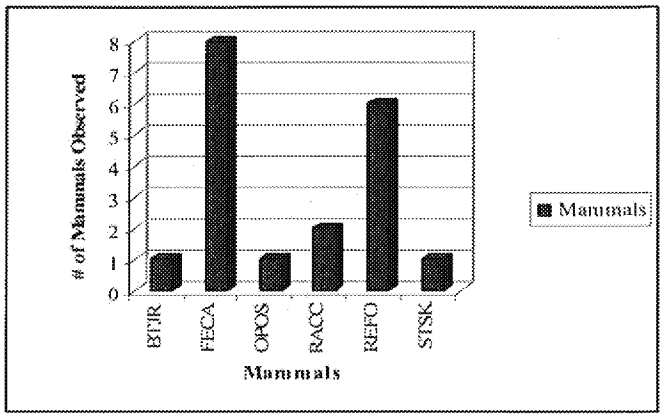


Figure 31. Summary totals of all mammals observed at LAX during night surveys (April 2005 – March 2006). BTJR = Black-Tailed Jackrabbit; FECA = Feral Cat; OPOS = Opossum; RACC = Raccoon; REFO = Red Fox and; STSK = Striped Skunk.

General Abundance at LAX - Mammal surveys were conducted from 2100 – 2200 hours on one day every other month from April 2005 – March 2006. A number of nocturnal mammal species were observed inside the airfield during the survey period and included: 1) BTJR = 1; 2) FECA = 8; 3) OPOS = 1; 4) RACC = 2; 5) REFO = 6 and; 6) STSK = 1 (Fig. 31). Although the diurnal fox/ground squirrels were not observed during the survey period, 128 were permanently removed from the airfield by WS in 2005. Analysis of bird strike data from 1991-2006 resulted in five species of mammals that were struck by aircraft with the number of strikes listed as follows: 1) domestic dog = 1; 2) gray fox = 1; 3) red fox = 6; 4) skunk = 1 and; 5) raccoon = 1.

Attractants – Desirable habitat and food availability attracts a variety of mammals to LAX. Open grasslands attract a variety of rodents and birds, which attract the larger fox and feral cats. The Argo Ditch retains water most of the year and attracts feral cats, ground squirrels, opossums, raccoons, red fox, and skunks. The acacia and eucalyptus trees growing on the north and southwest areas of the airport provide food and cover for black-tailed jackrabbits, feral cats, fox/ground squirrels, opossums, red fox, and skunks. Urban coyote populations are expanding in southern California and may eventually inhabit LAX, which can pose an even greater threat to aircraft and human health and safety.

Damage - Because of their moderate to large size, canines can easily damage the landing gear on an aircraft when struck or deflected into an engine on take-off. Foxes often cross runways, taxiways, paved areas, and roads as travel corridors in search of prey, which increases the potential for wildlife strikes. Red fox and squirrels can also undermine asphalt roadways to include runways and taxiways and chew electrical wires in ILS systems. Domestic dogs and coyotes can pose a greater risk to aircraft safety due to their larger size and unpredictability when frightened or dispersed. Feral cats are more prone to foraging in and around buildings and ditches, but have been dispersed from open grassland areas near the runway.

Legal Status – Red fox are classified as a fur-bearing mammal. A permit is not required to take red fox for depredation. However, the airport should contact the CDFG before initiating any lethal control. In addition, federal and state permits are not needed to remove feral dogs, feral cats, squirrels, skunks, and raccoons from the airfield. Black-tailed jackrabbits have been listed as a species of concern and may require a CDFG permit for lethal control.

Control Measures – Red fox can be effectively controlled by habitat modification and permanent removal by shooting and trapping. Dispersals can be difficult near runways due to their unpredictable behavior and may cross the runway multiple times if frightened. Airfield Operations staff are encouraged to report sightings of red fox on or near the runways to initiate control measures.

1. ***Habitat Alteration*** - The ideal scenario would be to fence the entire airfield with at least an 8-foot high fence including an Aburied apron™, which is a two-foot wide strip of fence attached to the base of the fence at a perpendicular angle and buried 12-24 inches under ground. Unfortunately, this may not be feasible due to installation costs and erosion problems. Clearing or thinning trees and shrubs at least 1000ft from the runway centerline, leveling dirt mounds to remove vantage points for red fox, and reduction of the prey base through trapping and pesticide application may be a feasible option in high risk areas such as the approach/departure ends of the runways. However, the cost of covering the entire airfield may be prohibitively expensive.

2. ***Hazing*** - Harassment with pyrotechnics may disperse foxes from critical areas, providing short-term relief of a potentially hazardous situation. Before initiating a hazing action, the potential response of the fox should be considered because they may respond in an unpredictable manner when frightened, i.e., take off in the opposite direction. If the fox is an airfield resident, harassment methods will not provide a long-term solution and it will eventually return. If the animal does not respond to hazing methods, it may have acclimated to loud noises and people or is possibly sick or injured and should be approached with extreme caution.

3. ***Catch-Pole*** - If a free-roaming dog is on the airfield and is approachable, i.e., wagging its tail and/or wearing a collar, it may be captured with a catch pole and placed in a kennel or live trap until the animal can be taken to the local Animal Control (Appendix 6).

4. ***Trapping*** – The use of padded leg-hold traps are currently illegal in the State of California, except for the protection of T&E species and human health and safety. Cage traps are effective for removing domestic dogs, feral cats, opossums, raccoons, skunks, and squirrels.

5. ***Snaring*** - Snares can be used to capture both free-ranging dogs and red fox. Snares are specialized equipment and should only be applied by qualified individual that is familiar with its function and regulations. WS Specialists are authorized to snare and can demonstrate or train LAX personnel on the proper and safe use of such devices. State permits are required for snaring.

6. ***Shooting*** - Shooting is a very selective control method, which eliminates chance of capturing a nontarget species. If shooting is not feasible, trapping and snaring can be use to remove a hazardous mammal.

8.0. RECOMMENDATIONS

The following recommendations are offered as a means to alleviate the hazards observed at LAX during the WHA, and can be readily adapted into a WHMP by the LAX Airport. The main purpose of these recommendations is to enhance the reduction of current wildlife hazards at LAX. Moreover, they do not diminish the need for LAX to report new hazards as airport conditions change.

Designate a Wildlife Coordinator and Delineate Responsibilities of All Personnel Involved

A wildlife coordinator should be appointed by the airport to respond to and monitor all wildlife related activities. It would be the responsibility of the coordinator to see that recommendations from the WHA are implemented and the appropriate wildlife control permits and supplies are obtained. The coordinator should keep a database of wildlife strike information collected from pilot reports, mechanical inspections, and runway sweeps. It should also be the coordinator's responsibility to ensure that LAX personnel, pilots and control tower personnel are familiar with the proper procedures for reporting all types of wildlife strikes and to make the FAA Form 5200-7 readily available.

The wildlife coordinator should actively participate in land-use projects or changes, on and off airport property that has the potential to increase wildlife hazards at LAX. Avoid building plans that have historically attracted bird nesting and roosting. Encourage the use of disposal methods that are not attractive to wildlife and the establishment of wildlife restoration areas as far as possible from critical zones of the airfield.

The wildlife coordinator should establish a committee for disseminating wildlife hazard information and coordinating wildlife control activities. The wildlife committee should meet at least once a year to discuss progress with wildlife activities, but may need to meet more frequently if situations dictate otherwise. The committee should have representatives from all

appropriate airport departments such as Management, Maintenance, Firefighting/Operations and Air Traffic Control. A wildlife hazard management program will need to involve each of these departments to varying degrees if it is to be effective.

Obtain the Necessary Permits to Control Wildlife

LAX currently possess a USFWS depredation permit to control wildlife protected by the State and Federal governments. The ability to respond to hazardous situations in a prompt and efficient manner is paramount to ensuring air safety and may sometimes require the lethal removal of hazardous wildlife. To enable a rapid response, the management at LAX should renew the depredation permit from the USFWS (Appendix 7) annually. WS is available to assist LAX in the application process.

Develop an Active Wildlife Hazard Control Program Using the Assessment as a Plan

One of the objectives of a WHA (as defined in 14 CFR Part 139.337(e) is to determine if a WHMP is necessary for the airport under review. It is our opinion that a plan is necessary at LAX because it provides the framework from which an active wildlife dispersal program operates. This document has been formatted in a manner that if faithfully adhered to and implemented, should satisfy most of the requirements of a WHMP for LAX, as outlined in CFR Part 139.337(e). Airports are dynamic environments, which require an annual review to determine if changes to the plan are necessary and to consider how the wildlife deterrent program can be improved or modified.

Train Personnel in Wildlife Hazing Procedures and Species Identification

All personnel that have duties requiring them to access the AOA should be trained to recognize and respond to potential wildlife hazards in an appropriate manner. Depending on the situation, responding may entail an active hazing or shooting action or it may simply require the employee to notify the wildlife coordinator or other responsible entity of the hazard. Every employee that might encounter wildlife hazards on the airfield should be made acutely aware that it is their responsibility to recognize and respond to the situation and not just the role of the wildlife dispersal team. Employees should also be familiar with the damage caused by wildlife and how to respond to potentially hazardous situations. Inherent in this decision process is that employees should be trained in species identification of the most hazardous wildlife or at least the general category/guild of wildlife, i.e., gulls, waterfowl, crows, hawks, and pigeons. A field guide is very useful for achieving this goal and should be made readily available to those who would use it. There are many guides that are easy to use and can be purchased at a local bookstore for $15 - $20 such as *Stokes Field Guide to Birds - Western Region* (Stokes and Stokes 1996), *All the Birds of North America* (American Bird Conservancy and Griggs 1997), and *Field Guide to the Birds of North America* (National Geographic Society 1999). All operations personnel should be trained in the safe handling and most effective use of hazing devices to avoid creating a more hazardous situation, i.e.,

chasing birds into the path of an approaching aircraft. WS offers a four-hour training course designed to familiarize airport personnel with basic bird identification and dispersal techniques involving hands-on training with an emphasis on safety.

Have Control Supplies (Pyrotechnics, Cannons, Effigies, Etc.) On Hand

It is recommended that vehicles regularly operating on the airfield be equipped with a 15mm single or double shot pyrotechnic launcher and an accompanying supply of bangers and screamers (Appendix 13). This will enable all airport personnel to quickly and easily haze any birds they may encounter while conducting other collateral duties. Due to security issues, firearms may need to be more closely regulated by LAX management. As a minimum, the airport should have on hand at least: 1) 15 mm pyrotechnic pistol launchers and caps (5 ea.); 2) bird bombs/bangers (10 boxes); 3) bird screamers (10 boxes); 4) .22 caliber pneumatic air gun and pellets. Additional supplies such as distress calls and effigies may be necessary as specific situations arise and it is up to the airport to ensure these static deterrents are procured in a timely manner.

Continue Monitoring Wildlife Populations and Use Patterns on the Airfield

The intent of this WHA has been to document general occurrence, land-use patterns, and population characteristics of wildlife at LAX. Attempts were also made to identify significant attractions within a 5-mile radius of the airfield that could adversely affect the safety of pilots and their passengers. It must be realized that wildlife abundance and use patterns on airfields are affected by a host of variables that are rarely the same from year-to-year. Hence, conclusions based on wildlife populations and patterns during this study are only meant to be a guide and may or may not be consistent in subsequent years. Survey routes and methods were cognitively established in a manner that facilitates continued monitoring by airport personnel. Data from this study will provide a baseline for comparison in subsequent years and LAX should continue to monitor wildlife populations by conducting monthly surveys using the same stations established in this assessment (Appendix 9). While surveys conducted in subsequent years by airport personnel will not be conducted with the same frequency or intensity as this initial hazard assessment, they will still provide general insights into wildlife use patterns over time and enable LAX to gauge the effectiveness of its control efforts. These monthly surveys will take about 1-12 hours and should be conducted by the wildlife coordinator or a trained individual designated by the coordinator.

Develop a Record Keeping System for Wildlife Strikes and Control/Hazing Actions

Wildlife strike records should be kept and maintained by the wildlife coordinator or designated individual. As was previously discussed, most strike records are incomplete and conclusions must be drawn cautiously. All bird remains, particularly feathers from the head, wings, and tail that are discovered as part of the routine runway sweeps for FOD should be retained until the type of bird can be identified by airport personnel or a WS biologist (refer to Section 3.2 for identification procedures or resources). If possible, place the remains in a

sealed plastic bag and freeze until the animal can be identified or place the remains in a trash container or other outdoor receptacle that can be secured to avoid attracting carrion-eating wildlife. Additional information that is useful includes the runway location where the carcass was found, e.g., 4,000ft distance remaining marker of Runway 24R, and nature of strike, e.g., reported by pilot, found during a runway sweep, found during mechanical inspection, etc.

Detailed records of wildlife dispersal and control efforts should also be maintained. Keeping a record of control activities on the airfield provides a useful index of wildlife abundance and use of the airfield over time. It only takes a moment to record the data and the information gained enables the manager or wildlife coordinator to monitor the effectiveness of different methods. Thorough records also protect the airport in the event of litigation or lawsuit following a damaging wildlife strike (Michael 1986), especially if injury or death has occurred. The minimum amount of information recorded should include the person conducting the action, the date, time, species, number of animals, location on airfield (the airfield should be partitioned into control zones), and control method used. It would also be useful to document the animal's response to the control action, e.g., abandoned airfield, flew to another zone, etc. A standardized form makes it quick and easy to log an action or observation. Records of action are most easily maintained on a computer database because the data can be easily extracted or sorted into a presentable report. Many databases also allow the data to be displayed in a graphical format, facilitating interpretation.

Issue a NOTAM or Advise the Tower When Hazards are Observed or Expected

Through a series of civil suits, the courts have established that a Notice to Airmen (NOTAM) is an acceptable mechanism for dispersing information regarding wildlife hazards at an airfield environment (Michaels 1986). Issuing a standing NOTAM that indicates bird hazards are present in the vicinity of the airfield throughout the year is generally not recommended. To be of benefit to pilots, a NOTAM, should be somewhat site-specific and time-specific. Sometimes, a sudden increase in wildlife abundance may occur due to an unforeseen or unpredictable factor such as an outbreak of insects on the airfield that attracts a large number of birds. In these situations, the wildlife coordinator should evaluate the situation and determine if a NOTAM should be issued until the hazard is mitigated.

If a short-term wildlife hazard is observed that may only last for a matter of hours or minutes, the tower should be notified immediately so the hazard can be included in the airport advisory to pilots. In some situations, it may be necessary for the tower to hold an aircraft until the threat can be eliminated, i.e., birds dispersed from the runway. LAX should meet with tower personnel to coordinate communication procedures involving wildlife hazards.

Reduce and Maintain Rock Doves at Low Levels

The use of decoy traps in terminal areas and immediately outside the airfield has reduced a significant number of birds since 2003. In addition, WS has been in contact with terminal maintenance and the airlines to remove rock dove nests and install exclusion barriers from

within the jet bridges as a long-term proactive solution to the problem. The additional removal of rock doves by shooting with a pneumatic air gun has also supplemented the numbers removed with traps by removing birds posing an immediate threat to aircraft safety on the airfield.

Nest Removal on Facilities

LAX should monitor pigeon, house sparrow, and starling nesting activity on buildings within the airport property and remove any nests that are found. Birds rearing young will increase the number of forays inside the airfield across runways to forage for insects.

Evaluate Potential Wildlife Hazards When Planning New Construction or Land Use Changes

Airports are constantly undergoing expansion and improvement projects. It is critical to consider wildlife attractants during these planning phases. Several aspects to consider will be the planting of new vegetation, which may provide food to wildlife in the form of seeds and fruits and the creation of water bodies or drainage basins that provide fresh water. Contact WS for review of airport plans and recommendations.

Adopt a Zero-Tolerance Policy toward Hazardous Wildlife

A policy of zero-tolerance on the airfield should be adopted toward all hazardous wildlife including, but not limited to: gulls, starlings, and rock doves (see Appendix 1 for a list of hazardous wildlife observed at LAX).

Haze Early and Consistently

All birds should be hazed from the airfield early in the morning. If birds are consistently chased each morning before they have a chance to feed, they will find alternative food sources and will be less likely to return later in the day. If this policy is consistently maintained, birds will soon learn to avoid the airport altogether. Once birds become established in an area, they become increasingly difficult to disperse, especially during the nesting season. Flocking birds, such as rock doves and starlings, decoy to groups of birds previously established, resulting in a dramatic increase in the number of birds on the airfield over a short period of time. To prevent this decoying effect, all birds should be dispersed from the airfield immediately upon their arrival.

Adopt a Policy of Lethal Control (Shooting) for Unusually Persistent Wildlife

Lethal control should be used to control birds that are non-respondent to other methods, especially crows, gulls, rock doves, and starlings. Lethal control of shorebirds, e.g., killdeer, should be used only in situations where they pose an immediate hazard to aircraft safety. It should be noted that when shooting gulls, it is not uncommon for the remaining birds to concentrate around the downed birds in a circling formation as they investigate. Therefore,

shooting should not be conducted if an aircraft is on final approach or is departing immediately unless it is a flock of 3 birds or less.