South Lake Tahoe Airport

LAKE TAHOE AIRPORT (KTVL)
WILDLIFE HAZARD ASSESSMENT
AIP 3-06-0249-034
SOUTH LAKE TAHOE, EL DORADO COUNTY, CALIFORNIA

PRESENTED TO:
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CITATION

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FRONTISPIECE: AERIAL VIEW OF LAKE TAHOE AIRPORT LOOKING NORTH TOWARDS LAKE TAHOE

Acronyms and Abbreviations

Abbreviation	Description
AC	Advisory Circular
AIP	Airport Improvement Program
AOA	Airport Operations Area; for this report, the area within the security fence
ATCT	Air Traffic Control Tower
ATIS	Automatic Terminal Information System
AWOS	Automated Weather Observing System
BGEPA	Bald and Golden Eagle Protection Act
CATEX	Categorical Exclusion
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CTAF/UNICOM	Common Traffic Advisory Frequency/Universal Communications
CWA	Clean Water Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FBO	Fixed-base Operator
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FOD	Foreign Object Debris
FR	Federal Register
GA	General Aviation
KTVL	Lake Tahoe Airport
LDA/DME	Localizer Directional Aid/Distance Measuring Equipment
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NOTAM(S)	Notice(s) to Airmen
NTSB	National Transportation Safety Board
PAPI	Precision Approach Path Indicator
PIREPS	Pilot Reports
REILS	Runway End Identifier Lights
RSA	Runway Safety Area
RW	Runway
USDA-WS	United States Department of Agriculture – Wildlife Services
USACE	United States Army Corps of Engineers
VOR/DME	Visual Observation Radio/Distance Measuring Equipment
WHA	Wildlife Hazard Assessment
WHMP	Wildlife Hazard Management Plan
WHWG	Wildlife Hazard Working Group

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1 EXECUTIVE SUMMARY

The purpose of this Wildlife Hazard Assessment (WHA) is to identify potential hazards to aircraft and human safety associated with wildlife populations and movements at and/or near Lake Tahoe Airport (KTVL or Airport) in South Lake Tahoe, El Dorado County, California. This WHA was conducted following Federal Aviation Administration (FAA) guidance and at the request of KTVL. Mr. Reinard W. Brandley, P. E., Consulting Airport Engineer, in association with KTVL, retained the Advantage Consulting LLC (Team) to conduct a WHA according to FAA standards and guidelines outlined in 14 CFR § 139.337, and this WHA was prepared by Dr. Ann Hodgson and Mr. Gary Exner, who are FAA Qualified Airport Wildlife Biologists as defined in Advisory Circular (AC) 150/5200-36A.

The FAA has made it a primary initiative for all Part 139 airports to complete a WHA and, if justified by the conclusions of the WHA, a Wildlife Hazard Management Plan (WHMP). The FAA's goal, as described within the FAA Western-Pacific Region, is to "assess potential hazards of wildlife at specified general aviation (GA) and Part 139 Certificated Airports, and develop wildlife management plans where needed." KTVL is a Part 139 airport, with a status review planned for March 17, 2015. According to the FAA Wildlife Strike Database, four strikes were reported at KTVL in the early 1990s, and only one reported strike qualified as a triggering event for a WHA. FAA funding enabled the initiation of this WHA in 2013

A WHA is a tool to help airport operators determine the abundance and use patterns of wildlife around the airport. The WHA was designed to identify wildlife attractants of hazardous wildlife species as defined in AC 150/5200-33B. This WHA includes a discussion of historic and recent conditions at KTVL, the status and attraction characteristics of adjoining land uses, results of the wildlife surveys, a hazard risk analysis, and recommendations. If the FAA deems a WHMP necessary, the data and information gained through a WHA is used to prepare a WHMP. The WHA is used to support the preparation of a WHMP, and the WHMP outlines the wildlife management responsibilities of the airport staff and other stakeholders.

To ascertain seasonal and daily patterns and movements, the Team Biologist conducted point-count wildlife surveys for 12 consecutive months from October 2013 through September 2014, during two days per month. Point-count surveys were conducted three times a day in dawn, mid-day, and evening/night survey events during each visit, for a total of 72 survey events in the 12-month period. Six observation points were established within the Airport Operations Area (AOA). For this WHA, the AOA was defined as property within the Airport security fence. Five other observation points located outside the AOA within a 5-mile separation distance were surveyed. Avian observations comprised 96.1% of all wildlife observations during the WHA study period. Of the total avian observations, 22.4% occurred on the Airport, and 77.6% occurred off the Airport. During each monthly survey event, an average of 24 birds was seen at each of the five AOA sites, and an average of 83 birds was seen at each of the six off-AOA sites, with the majority of these avian observations occurring at the shoreline of Lake Tahoe, near the Tahoe Keys Homeowners Association about 5 miles northeast of the Airport. Because the point-counts were repeated three times each day at each station on two successive days each month, it is probable that the same individuals were counted repeatedly at each station on each count. The assessment included investigating areas for concentrations of wildlife attracted to specific features. Nighttime spotlight surveys were conducted each season, and small mammal trapping surveys were completed in the spring and fall.

The number of birds was highest during the fall migration period in October 2013 and declined during the winter months. Avian activity increased in spring 2014 with the arrival of migrating flocks and seasonally nesting species. Avian observation counts declined after the nesting season, and increased during fall migration in September 2014. The most abundant guilds were waterfowl (55.4%), passerines (19.8%), corvids (8.5%), and icterids/starlings (7.5%). Waterfowl (primarily Canada geese and mallards) were observed most frequently flying over the Airport during migration and the nesting season. They created a significant risk to pilots because they were poorly visible coming through the valley from either the north or south directions. Passerines, corvids, and icterids/starlings guilds were observed foraging, perching/nesting, and loafing in

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varying numbers at various locations and throughout the year. Total annual avian populations cannot accurately be estimated due to variations in climate year to year.

Of the 313 mammal/other wildlife observations, 55.0% occurred on the Airport, and 45.0% occurred off the Airport. Resident coyotes were the dominant large mammal, and were observed hunting regularly on the AOA. They accounted for 32.3% of the observations in the mammal/other guild.

Survey results and strike data show that the potentially most hazardous wildlife at KTVL includes waterfowl, corvids, raptors, ground foraging passerine species, and canids. Based on monthly observation point counts and strike data, the risk of wildlife strikes at KTVL would be greatest during spring migration and nesting season (March through May), and fall migration (September through November). Of the four strikes documented previously at KTVL, one (25%) occurred in March, and three (75%) occurred during the fall migration.

The primary wildlife attractants identified in this study were the tall-grass and brushy infields at KTVL and several water bodies within two miles of the aircraft movement areas. Avian species congregated in the infields to forage and seek shelter. The WHA process requires listing various recommendations that may ultimately be selected for management tasks in the WHMP. Modifying the vegetative composition of the infields, and closely monitoring migration activities at attractant areas outside the AOA can reduce this potential hazard. Various water bodies around KTVL are recognized avian attractants, and avian movements between these attractants often involve birds crossing KTVL airspace. Mitigation for these attractants may be considered in the WHMP.

The recommendations in this WHA listed below are prioritized based on feasibility with respect to cost, availability of FAA grant funding, equipment, and/or personnel availability, while considering the potential risk of hazards to aircraft safety.

- Modify habitat within the airport infield and adjacent AOA perimeter areas.
- Repair the AOA fence breaches and gate gaps.
- Increase routine inspections of the AOA perimeter to monitor wildlife intrusion.
- Increase timely wildlife hazing and harassment.
- Implement a wildlife observation reporting and communication plan.
- Encourage continued and enhanced notification and communications from Airport Operations and pilots using KTVL.
- Develop a Wildlife Hazard Working Group (WHWG) and implement an active community involvement program.

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2 AIRPORT BACKGROUND

The Lake Tahoe Airport (KTVL or Airport) is a city-owned public-use Airport located 5 miles southwest of the central business district of the City of South Lake Tahoe, El Dorado County, California (Figure 1). The average elevation of the Airport is 6,269 feet. The Airport covers an area of 348 acres and has one active asphalt paved runway; Runway 18/36 is 8,541 feet long by 100 feet wide (Figure 2).

Regularly scheduled passenger service ceased in 2000, and the FAA Air Traffic Control Tower (ATCT) was closed in 2004. Operational statistics for KTVL as reported by Airport IQ 5010, Airport Master Record, are shown below (Table 1).

TABLE 1. 2014 AIRPORT OPERATIONAL STATISTICS

Aircraft Type	No. of Aircraft	No. of Operations	Aircraft operations: avg. 65/day
Aircraft based on the field:	28	17,777	Itinerant general aviation
Single engine airplanes:	22	1,100	Itinerant air taxi
Multi engine airplanes:	3	4,573	Local general aviation
Jet airplanes:	0	420	Itinerant military
Helicopters:	3	55	Military

(SOURCE: FAA APO TAF, per R. W. Brandley, P. E., 3/23/2015)

Aeronautical services are available locally at the Airport through Mountain West Aviation, a Fixed-Base Operator (FBO) whose services include fueling and hangar rental to provide for the needs of the aviation community. Some of the services offered at KTVL include aviation fuel (100LL, Jet-A), de-icing, aircraft storage, flight planning, flight school/flight instruction, catering, car rental, on-call charter service, as well as auxiliary power unit. Aircraft range in size from small general aviation aircraft to large corporate jets.

An on-site Aircraft Rescue and Fire Fighting (ARFF) Station is readily accessible to attend to aviation related emergencies at the Airport. The emergency personnel have FAR Part 139, Index A Aircraft Rescue and Fire Fighting capability. The FAA has provided funding for various airport improvements.

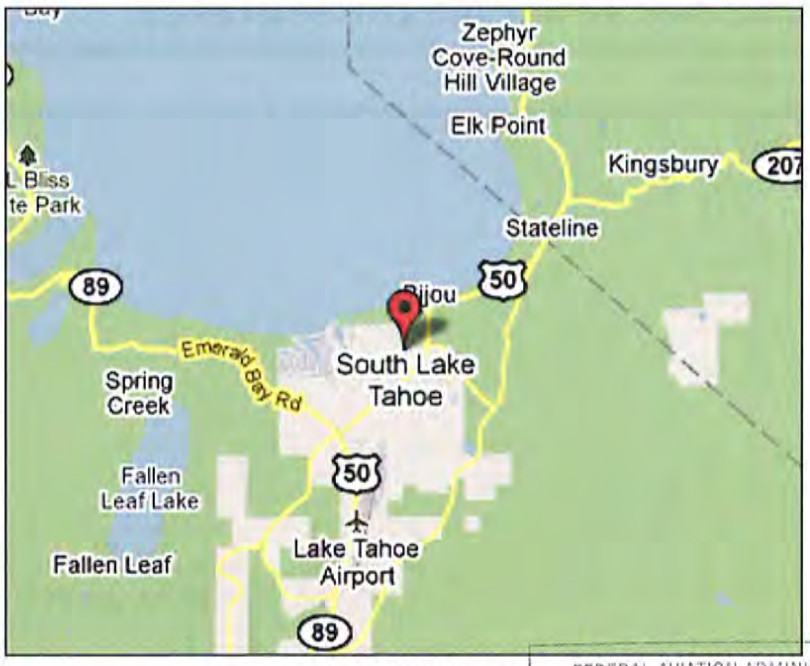

FIGURE 1. KTVL LOCATION

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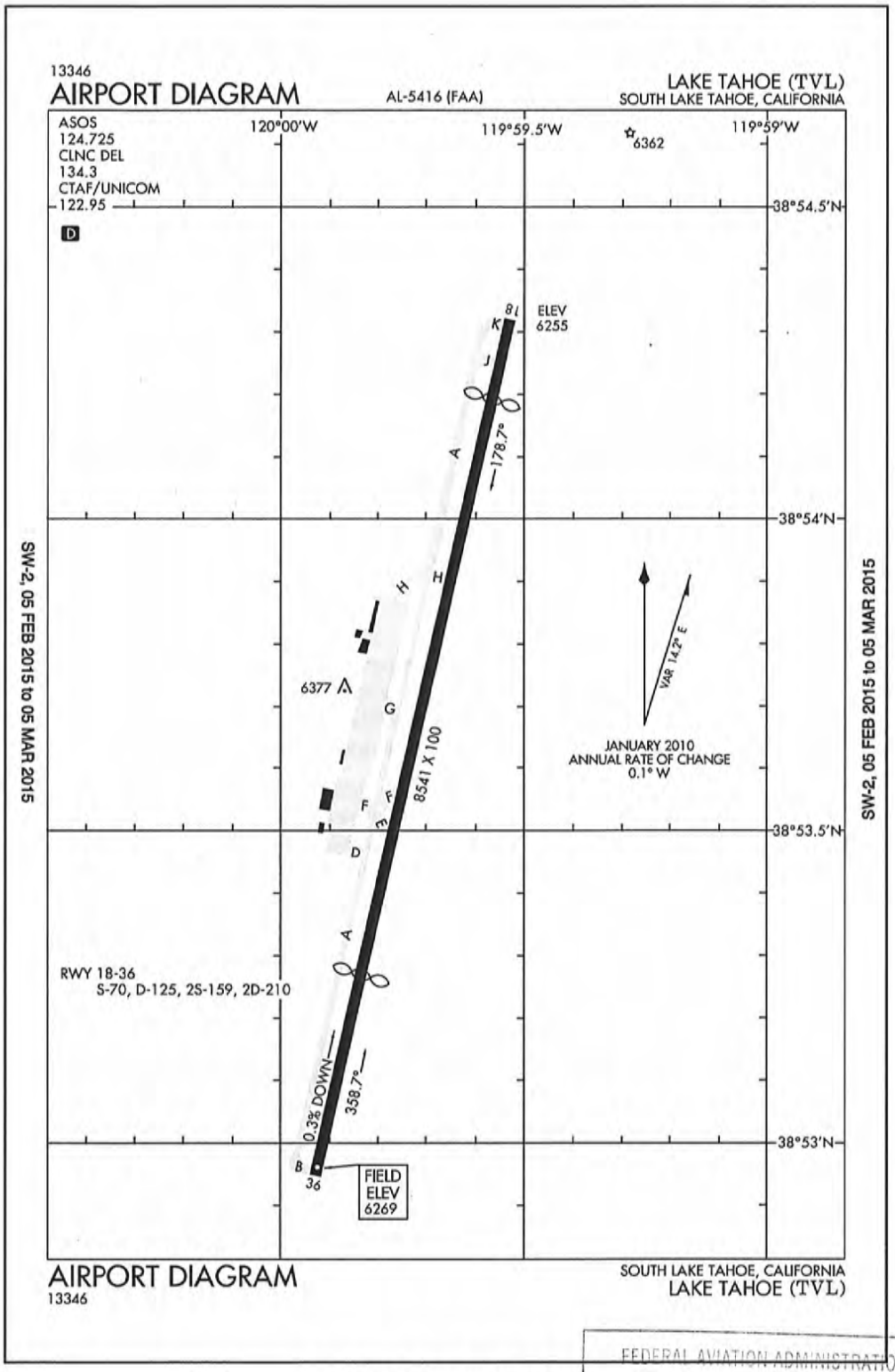

FIGURE 2. KTVL DIAGRAM

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3 WILDLIFE HAZARD ASSESSMENT – TRIGGERING EVENT REQUIREMENTS

The Federal Aviation Administration (FAA) issued a Certification Alert (CertAlert) to airport operators on June 11, 2009, reminding them of their obligation under 14 CFR Part 139 to conduct WHAs, if they experience or have previously experienced, a "triggering event" as outlined in Part 139.337(b):

1) An air carrier experiences multiple wildlife strikes;
2) An air carrier aircraft experiences substantial damage from striking wildlife;
3) An air carrier aircraft experiences an engine ingestion of wildlife; or
4) Wildlife of a size, or in numbers, capable of causing any of the items described above.

Airport sponsors and managers have a legal responsibility under federal regulations (Title 14 Code of Federal Regulations, Part 139) to ensure the airport maintains a safe operating environment. As part of this responsibility, they must assess the risk and magnitude of the wildlife strike problems for their airport should one of the four conditions occur [14 CFR, Part 139.337(b)(1)-(4)]. This assessment is addressed in a Wildlife Hazard Assessment (WHA) report.

While KTVL has not had a recent triggering event, FAA funded this WHA to identify the risk and magnitude of the earlier wildlife strike problems at the Airport. The findings of the WHA indicate that a WHMP is recommended. The data collected in the WHA will be used to develop the WHMP, which will serve as a guiding document of procedures that the Airport will follow to mitigate wildlife hazards.

3.1 Strike Data Analysis

A total of four wildlife strikes, all involving birds, were reported to the FAA Wildlife Strike Database for KTVL in the early 1990s. The complete list of wildlife strikes reported for KTVL over the 23-year period shows 3 commercial aircraft, or 75% of the total number of reporting strikes (Table 2). Three of the strikes (75%) occurred during daytime, and one strike (25%) occurred at dusk.

The strike that occurred on August 28, 1992 reported a group of multiple birds observed as the American Eagle air carrier aircraft began the critical climb phase during departure (Figure 3). The pilot executed a precautionary landing and the strike resulted in $5,000 damages. While the event did not involve an engine ingestion, the climb phase is often recognized as the most critical phase of flight when the pilot may not have sufficient power or maneuverability to avert a wildlife strike.

FIGURE 3. AMERICAN EAGLE AIRLINES HIT MOURNING DOVES AND EXECUTED A PRECAUTIONARY LANDING (PHOTOGRAPH OF THE STRIKE DAMAGE WAS NOT AVAILABLE)

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TABLE 2

LIST OF WILDLIFE STRIKES REPORTED AT KTVL 1991-2014

NATIONAL WILDLIFE STRIKE INCIDENTS	
1995-03-07	**Time:** Day, **Sky:** Overcast, **Precipation:** Snow, **Operator:** Business, **Aircraft:** C-208 (Airplane), **Mass:** 2251 - 5700 kg, **Engines:** 1, **Power Type:** Turboprop, **Registration:** N7580B, **Remains Collected:** No, **Runway:** 28, **Above Ground:** 100 ft, **Speed:** 90 knots, **Phase of Flight:** Approach, **Birds Seen:** 11-100, **Birds Struck:** 1, **Species:** DUCKS, **Size:** Large, **Pilot warned of birds/wildlife:** No, **Strikes/Damages:** Struck Other, **Effect On Flight:** None, **Report Type:** FAA Form 5200-7 **Comments:** OPERATOR = SPEND AIR **Remarks:** PILOT HEARD THUMP BUT COULDN'T TELL WHERE BIRD STRUCK.
1992-08-28	**Time:** Day, **Sky:** Overcast, **Precipation:** None, **Operator:** American Eagle Airlines, **Aircraft:** FAIRCH SA227 (Airplane), **Mass:** 2251 - 5700 kg, **Engines:** 2, **Power Type:** Turboprop, **Registration:** N629AV, **Remains Collected:** No, **Runway:** 36, **Above Ground:** 5 ft, **Speed:** 107 knots, **Phase of Flight:** Climb, **Birds Seen:** 2-10, **Birds Struck:** 2-10, **Species:** MOURNING DOVE, **Size:** Medium, **Pilot warned of birds/wildlife:** No, **Strikes/Damages:** Struck Wing or Rotor, Struck Landing Gear, **Effect On Flight:** Precautionary Landing, **Repair Costs:** $5000, **Report Type:** FAA Form 5200-7
1992-08-23	**Time:** Dusk, **Sky:** Some Cloud, **Precipation:** None, **Operator:** Nashville Eagle, **Aircraft:** SA227 AC METRO III (Airplane), **Mass:** 2251 - 5700 kg, **Engines:** 2, **Power Type:** Turboprop, **Registration:** N628AV, **Remains Collected:** No, **Speed:** 90 knots, **Phase of Flight:** Landing Roll, **Birds Seen:** 2-10, **Birds Struck:** 1, **Species:** BIRD - SMALL, **Size:** Small, **Pilot warned of birds/wildlife:** No, **Strikes/Damages:** Struck Engine 2, Struck Propeller, **Effect On Flight:** None, **Report Type:** FAA Form 5200-7
1991-10-03	**Time:** Day, **Sky:** No Cloud, **Precipation:** None, **Operator:** Wings West, **Aircraft:** MERLIN III (Airplane), **Mass:** 2251 - 5700 kg, **Engines:** 2, **Power Type:** Turboprop, **Remains Collected:** No, **Runway:** 36, **Above Ground:** 100 ft, **Speed:** 140 knots, **Phase of Flight:** Approach, **Birds Seen:** 1, **Birds Struck:** 1, **Species:** RED-TAILED HAWK, **Size:** Medium, **Pilot warned of birds/wildlife:** No, **Strikes/Damages:** Struck Wing or Rotor, **Effect On Flight:** None, **Report Type:** FAA Form 5200-7 **Remarks:** RT FLAP. NO DAMAGE. FLT 5143.

4 METHODOLOGY

The Advantage Consulting LLC Team (Team) was selected to conduct the year-long WHA. The Team includes: Gary Exner, FAA Qualified Airport Wildlife Biologist, and Ann B. Hodgson, Ph.D., FAA Qualified Airport Wildlife Biologist. The preliminary assessment tour and kick-off meeting for the WHA was conducted on October 21, 2013. Attendees at the kick-off meeting included the Team, the Airport Director, the Airport's Consulting Airport Engineer, and staff responsible for general operations at the Airport.

The WHA is defined as a 12-month assessment to establish background information that addresses the collection of monthly and seasonal data specific to the observation frequency and types of wildlife that are regularly and/or occasionally observed at attractant areas inside and outside the Air Operations Area (AOA). Particular attention is paid to wildlife that may pose medium to high-risk threats to aircraft during approach, climb, departure, and circling procedures.

The first six monthly inspections at KTVL and surrounding areas included information from October 2013 through March 2014, provided as the Wildlife Hazard Assessment Progress Report. The Progress Report summarized three key findings: (1) the fence had many gaps and breaches, such that wildlife activity would be difficult to reduce by actions taken by the Airport staff without extensive fence repair; (2) tree and shrub cover

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was present on the AOA that should be removed to minimize wildlife access, habitat attraction and cover; and (3) the drainage ditch on the west side of the airport is overgrown with cattails and willow shrubs that should be removed to eliminate wildlife cover, and the ditch drainage off-site should be improved. The ditch drains into a sediment area to the north of the runway and the major part of the ditch in this area was also overgrown with shrubs and should be cleaned out to improve drainage and reduced ponded water.

Wildlife incursions were most numerous during the spring, summer, and fall, when wildlife were most active in the Lake Tahoe basin. Additional activity occurred during the spring and fall migration periods when migratory waterfowl are moving in the basin. Winter wildlife activity was greatly dependent on the frequency and intensity of significant winter storm events. Airport operations staff used pyrotechnics as necessary to haze Canada geese off the airport, but occasional hazing did not affect the number of wildlife observations inside the AOA (Figure 4).

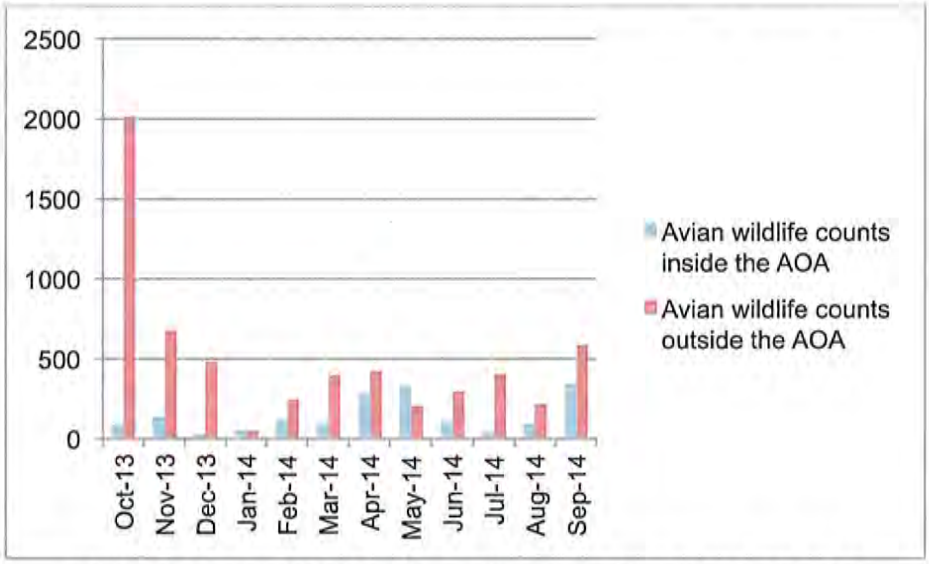

FIGURE 4. TOTAL AVIAN WILDLIFE COUNTS INSIDE AND OUTSIDE THE AOA

4.1 Study Area Description

Lake Tahoe Airport is surrounded by approximately 180,000 acres of the US Forest Service - Lake Tahoe Basin Management Unit. The Lake Tahoe basin contains the largest alpine lake in North America, and is located on the east–west boundary of two major bio-geographic provinces. The basin encompasses an elevation range from 6,229 to 10,881 ft. The town of South Lake Tahoe lies next to the lake on the north boundary of the Airport.

Dominant habitats are forests of Jeffrey pine, white fir, and other conifers, and herbaceous and scrub-shrub riparian wetlands bordering the Upper Truckee River. Although five conifer species were present, the mixed conifer forests in the west shore units were heavily dominated (75%) by white fir (Figure 5).

The study area was defined with reference to Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5200-33B (*Hazardous Wildlife Attractants on or Near Airports*). Airport operations include both piston-powered and turbine-powered aircraft. For the purpose of this WHA, the 10,000 foot separation distance and 5-mile separation distance criteria from the active airport surface were used for the project study area (Figure 6). The 10,000 foot separation distance is defined as the focus area for wildlife observation data collection during the WHA, and is also reviewed for compatible land use in the areas near the Airport. The focus of the assessment in the 5-mile separation distance was to assess compatible land use changes or developments in these areas.

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FIGURE 5. VIEW OF THE AIRPORT TERMINAL AND FBO, WITH MIXED CONIFER FOREST IN THE BACKGROUND

The existing FAA regulations specify the separation criteria based on aircraft type and flight patterns. The separation distances are determined by: (1) flight patterns of piston-powered aircraft and turbine-powered aircraft; (2) the altitude at which most strikes, or 78%, occur at or less than 1,000 feet above ground level, and 90% occur at or less than 3,000 feet above ground level; and (3) National Transportation Safety Board (NTSB) recommendations.

Airports selling Jet-A fuel normally serve turbine-powered aircraft. In this case, the FAA recommends a separation distance of 10,000 feet at these airports for any of the hazardous wildlife attractant areas, or for new airport development projects meant to accommodate aircraft movement. This is the ideal separation distance to be maintained between an airport's AOA and the hazardous wildlife attractant areas.

When considering proposed land use changes, airport operators, local planners, and developers must take into account whether the proposed land use changes, including new development projects, will increase wildlife attractants and consequently increase wildlife hazard potentials to aircraft. Some land use practices may attract or sustain hazardous wildlife populations on or near airports, which in turn can significantly increase the potential for wildlife strikes in those areas.

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FIGURE 6. KTVL 5-MILE AND 10,000 FEET SEPARATION DISTANCE STUDY AREAS

4.2 Observation Points Inside the AOA

Observation points within the AOA are identified as OP-1 through OP-6 (Figure 7). These observation points were selected in locations that provide wildlife information specific to potential incursion areas at or near runways and taxiways. OP-1 includes the Terminal, general aviation (GA) apron, and hangars; OP-2 overlooks the AOA from the southwest hillside; OP-3 provides a view of the Upper Truckee River watershed at the south end of the AOA; OP-4 provides a similar view of the Upper Truckee River watershed on the east side of the AOA; OP-5 provides a similar view of the Upper Truckee River watershed at the north end of the AOA; and OP-6 overlooks the AOA from the western hillside. These observation points allowed for a complete and generally panoramic coverage of wildlife activities inside the AOA.

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4.3 Observation Points Outside the AOA

Observation points outside the AOA are identified as XP-1 through XP-5 (Figure 8). XP-1 was on the east side of the Airport by the Upper Truckee River; XP-2 overlooked the river from the bicycle bridge north of Lake Tahoe Boulevard; XP-3 was at the intersection of Highway 50/Emerald Bay Road and Elks Club Drive south of the Airport; XP-4 overlooked the AOA from the east side of Highway 50/Emerald Bay Road; and XP-5 had a panoramic view of the Lake Tahoe shoreline from the Tahoe Keys Homeowners Association pier. These observation points were selected to establish monitoring locations that could allow evaluation of wildlife activities at identified attractant habitats at varying distances within the 5-mile separation distance of the Airport, and particularly along the approaches for the runways. In addition to designated AOA and external observation points, incidental observations of wildlife activities were noted and included in the WHA.

FIGURE 7. OBSERVATION POINTS INSIDE THE AOA

FIGURE 8. OBSERVATION POINTS OUTSIDE THE AOA

4.4 Waste Management & Landfills

The City of South Lake Tahoe contracts with South Tahoe Refuse & Recycling Services to collect solid wastes at the Airport. Solid waste is transferred at the Material Recovery Facility, 2140 Ruth Avenue, South Lake Tahoe, and trucked to the disposal facility at Sparks/Lockwood, Nevada, 70 miles northeast of the City. There were no indications of frequent or regular wildlife migrations between the landfill and the Airport (Figure 9).

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FIGURE 9. LOCATION OF LOCKWOOD LANDFILL, SPARKS, NEVADA

FAA Advisory Circular No. 150/5200-34A entitled "Construction or Establishment of Landfills near Public Airports (January 26, 2006)", describes the required separation distance prescribed by federal law between a new municipal solid waste landfill and a public airport. Landfills that were constructed before April 5, 2000 are exempt from this statute. Existing landfills that began modifications before this date are also exempt. The City of South Lake Tahoe - Special Waste & Diversion Facility was constructed and opened in 1978. There are no current plans to modify or construct any associated facilities within the 5-mile radius of the Airport.

4.5 Water Features

The Airport is situated in a lower montane basin adjacent to Lake Tahoe. Numerous natural wetlands and water bodies occur within a two-mile (10,000 feet) radius around the Airport, and other water features are within the 5-mile study area. These water bodies were primarily floodplain wetlands associated the Upper Truckee River watershed and adjacent to Lake Tahoe (Figure 10). Wildlife observations during daily monitoring events at the inside and outside observation points around KTVL were focused on aquatic-related attractants in the vicinity of the Airport because wildlife frequently congregate at water attractants.

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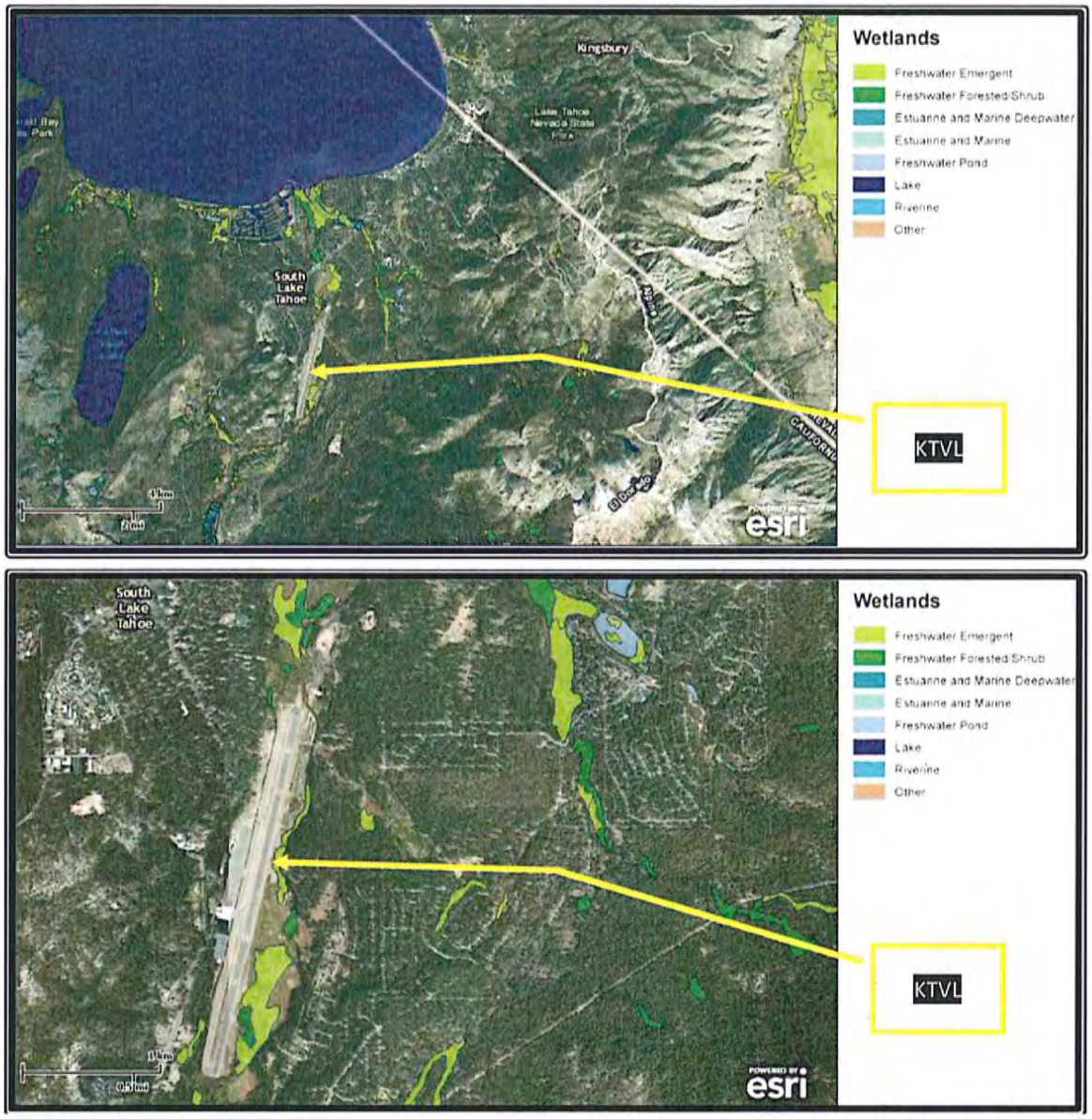

FIGURE 10. U. S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY - WATER BODIES, CREEKS, RETENTION BASINS, AND WETLANDS IN THE VICINITY OF KTVL (ABOVE), AND IN THE UPPER TRUCKEE RIVER FLOODPLAIN NEAR THE KTVL AOA (BELOW)

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5 RESULTS

The study results include an analysis of day and night wildlife survey observations at the Airport, and at off-site observation points and incidental observations at non-specified points. Relevant airport operations information gathered for a twelve-month assessment period beginning with the initial kick-off meeting and inspections in October 2013 is also included. Monthly assessment monitoring reports were provided to the Airport Engineer and Airport Director. These reports detailed the number of wildlife observations of each species of wildlife, and relevant notes about attractants and habitat use.

5.1 Summary

Wildlife observations were most numerous during the spring breeding season, wildlife activity declined through the summer months, increased during fall migration, then decreased during the winter. During the summer (July-August 2014), the parking apron in front of the FBO was being re-paved, however, construction-related activities did not cause an increase in the concentration of wildlife or number of wildlife observations around the construction site.

Snowstorms occur regularly in Lake Tahoe, and wildlife activity decreases until the storms abate and wintering wildlife emerge to resume foraging. Lake Tahoe received 6 inches of snow on October 28, 2013, and several winter snowstorm events followed throughout the winter season continuing through March 2014. However, the Lake Tahoe area experienced the fourth year of a drought and snow pack was about 18% of normal.

The boundary line fence at the airport provides security for the airport and discourages wildlife incursions. The fence should be repaired to correct all damaged sections and eliminate voids large enough for animals to pass through or discourage animals from digging under the fence. There are several areas where trees and shrubs border the fence and have damaged the fence. The FAA recommends a 10-foot cleared area outside the fenced area to provide clear space for monitoring humans and wildlife activity near the airport and to discourage humans from climbing the fence. Maintaining a 10-foot cleared area would help to maintain the integrity of the fence, monitor animal activity in the area, and make corrections and repairs. Regular inspections along the AOA perimeter are critical in maintaining a secured AOA fence. Mobile terrestrial wildlife, primarily coyotes, enter the AOA by moving through unsecured gates or fence lines, or un-grated culverts, or by digging under the fence where it is not secured. On a few occasions, black bears climbed over the fence and horizontal outriggers.

The fence around the AOA has numerous breaches where wildlife incursions by coyotes and other smaller mammals occurred regularly. Much of the perimeter fence requires some repair, and the fence line adjacent to the Upper Truckee River watershed should be modified to address providing drainage while establishing a functional fence. A black bear sow and three cubs were observed climbing over the fence at the Mountain West FBO, where they later vandalized the office and dumpster.

Spotlight surveys were conducted to assess the wildlife activities in and around the Airport during each season of the assessment. The spotlight surveys flushed a few roosting passerines (mostly mountain bluebirds) from the edges of the taxiways as the survey vehicle passed. Other hazardous wildlife activity was not noted during the spotlight surveys. California Shock Trauma Air Rescue (CALSTAR) staff using night vision electronics as their helicopter approached the runway reported seeing coyotes frequently on the AOA at night.

5.2 Wildlife Habitat On The Airport

KTVL is situated in a montane valley oriented north (towards Lake Tahoe) – south (towards Sacramento, California). The Upper Truckee River and its narrow floodplain encircle the south, east, and north boundaries of the Airport (Figure 11). The river floodplain is a Stream Environment Zone (SEZ) regulated by the Tahoe Regional Planning Agency (TRPA) and portions of the old floodplain overlap onto the east and north margins of AOA. The current land capability maps for the Airport show the boundaries of the SEZ. Habitat management in SEZ zones will require review and possible permitting by the TRPA.

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FIGURE 11. UPPER TRUCKEE RIVER ADJACENT TO KTVL

Coniferous pine and fir trees dominate the landscape around the Airport, and young trees are encroaching onto the areas around the taxiway and runway. The trees are a wildlife attractant, providing cover and forage for many wildlife species. As these trees grow, they will continue to provide perching and nesting habitat. Along the perimeter fence line, many trees are growing through the fence or leaning over it, where they can potentially degrade the stability and integrity of the fence and allow for potential wildlife ingress.

Reinard W. Brandley, P. E., Consulting Airport Engineer conducted an obstruction study, in September 2006, based on aerial photography acquired September 12, 2005. The study diagrammed the position of existing trees at that time. Field inspections during the WHA indicate that additional trees have become established since the study. The Airport does not have a permit currently to remove trees but is working with federal, state, and local agencies to develop a long-term tree removal plan.

Several species of shrubs grow commonly in the vicinity of the Airport. Willows grow bordering the drainage ditches, scattered in wet depressions on the AOA and along the AOA perimeter fence on the river's floodplain (Figure 12). Sagebrush and similar shrubs tolerate drier soils and are prevalent at the south end of the AOA. Operations staff removed a few sagebrush shrubs from the median between the runway and taxiway on the AOA during summer 2014. All shrub species are wildlife attractants, providing cover, nesting habitat, hosting larval and adult insects, and supplying seeds and berries as wildlife forage.

FIGURE 12. WILLOWS GROWING ON THE AOA AND ALONG THE AOA FENCE

Wildlife activity on airports varies depending upon the available forage base, which includes seeds, berries, invertebrate and vertebrate species. The coniferous trees, shrubs, grasses, and wildflowers produce various forage sources that are recognized as attractants to wildlife. Vertebrate prey, such as mice and voles, were present throughout the grassy areas of the AOA. Small rodents and mountain cottontail rabbits were the most common small mammal prey available to the several packs of coyotes observed on the airfield. Small grass-nesting birds were prevalent along the northwestern and western sides of the AOA. These birds were observed transitioning back and forth from the river floodplain and surrounding forests to the grassy areas within the AOA. Raptors were frequently observed hunting for small birds and mammals on the AOA.

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Some storm water on the airport is managed via a storm water retention pond located south of the Airport Terminal and hangars connected to a drainage ditch system on the west side of the AOA (Figure 13). The pond was inspected during each survey, and one pair of red-winged blackbirds nested in the cattails. Mountain yellow-legged frogs, a prey species, were heard calling from the pond in the spring. The detention pond was designed with a weir and pipe outlet. Pond operation was planned to close the valve on the outlet pipe only during significant storms, however, the pond is currently operated leaving the valve closed at all times. As a corrective measure, the Airport should, during the non-nesting season, clean out all the accumulated organic matter and debris from the pond and leave the outlet valve open at all times except during major storms. The valve should be closed prior to major storms and then reopened within 24 hours of the end of the major storm. This would eliminate long-term water storage in the pond.

Storm water drains through a culvert into the drainage ditch on the western side of the AOA, then to the north end of the AOA and off-site to the Upper Truckee River. The drainage ditch held water throughout the year, and was vegetated along its length with cattails, willows, and herbaceous ground cover. The combination of water in the ditch, with some floating aquatic vegetation, and heavy plant cover on the banks of the ditch provided a wildlife attractant throughout the year. Waterfowl are attracted to this ditch as they transition across the airport. On the east side of the AOA, three short drainage ditches drain under the AOA perimeter fence into the river's floodplain.

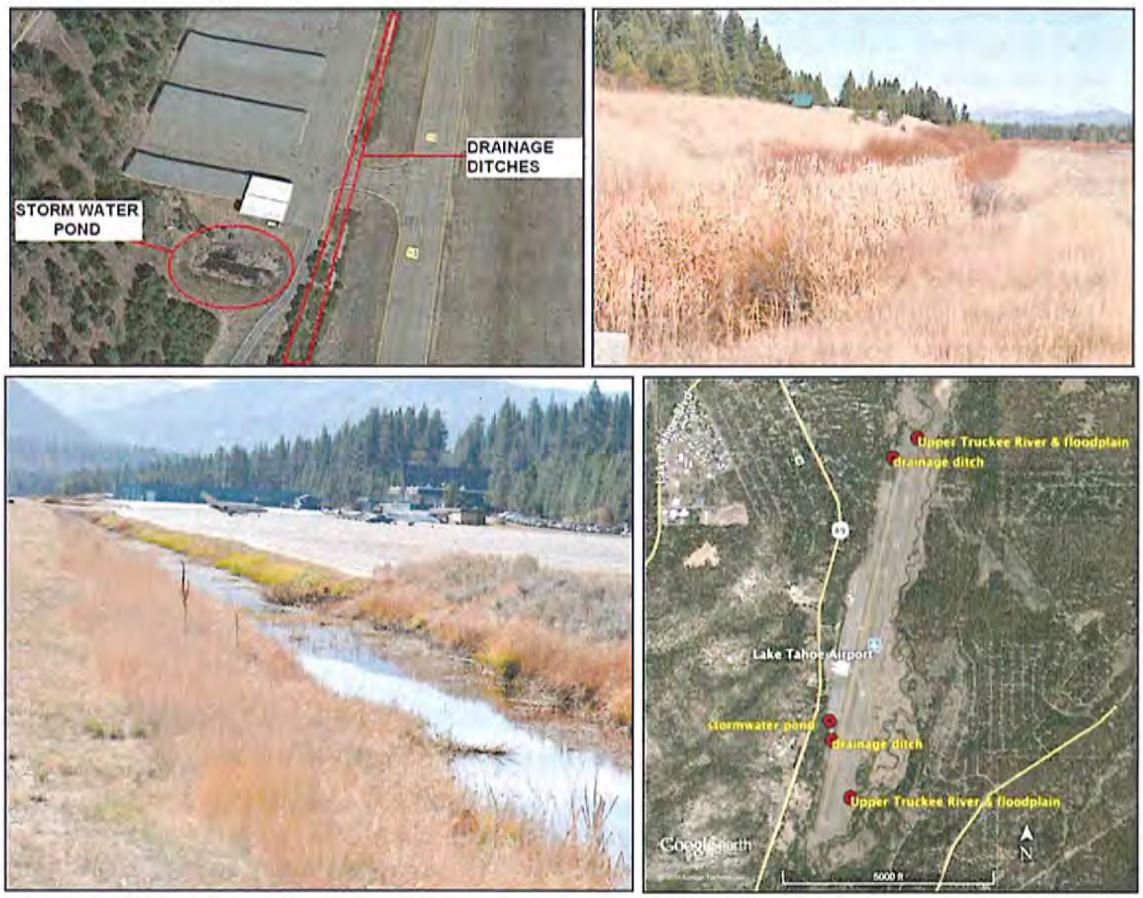

FIGURE 13. STORM WATER POND, DRAINAGE DITCHES, AND WATER FEATURES ON KTVL

Several hangars were inspected during monitoring events to identify any nesting areas for wildlife within the structures. Hangars were essentially free from nests and wildlife dwellings. Hangar doors were typically closed except when aircraft were being taken from, or returned to those areas. Some of the hangars had

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openings through small gaps in the doors or roof panels, but there were no observed wildlife nesting attempts in the hangars. Barn swallows and Steller's jays built nests in the Terminal tunnel.

5.3 Wildlife Habitat Off The Airport

U.S. Highway 50 (State Road 89), the main route going west from the town center, borders the west side of KTVL and has scattered low-density industrial and commercial development, with a few residences perched on the hillside between U.S. Highway 50 and the northwest Airport property boundary. The Upper Truckee River and its floodplain surround the south, east, and north sides of the AOA. Beyond the river, low-density residential development and the Tahoe National Forest surround the Airport. Overall development will likely remain unchanged given the TRPA regional development guidelines for the Tahoe Basin.

Water features within two or three miles of the Airport may serve as wildlife attractants. Lake Tahoe lies two miles north of the Airport, and supports migratory waterfowl including large numbers of Canada geese and American coots migrating through or resident in the watershed. The Lake, the Upper Truckee River and its associated floodplain wetlands, and the golf course have water features that attract migrating waterfowl and other foraging, nesting, and loafing wildlife species (Figure 14).

FIGURE 14. WATER BODIES AROUND KTVL

The Lake Tahoe Golf Course lies north of U.S. Highway 50, and two miles southwest of KTVL. The golf course participates in the Audubon International Cooperative Sanctuary Program for Golf Courses. This program encourages golf courses to use environmentally benign management techniques, and to enhance wildlife habitat. The golf course newsletters for the last couple of years described programs to build and install passerine bird nesting boxes.

The shopping centers and commercial sites around the intersection of Highway 50 and Lake Tahoe Boulevard (the "Y"), and the city parks along the shoreline of Lake Tahoe also were recognized wildlife attractant areas that resulted in groups of ravens and gulls congregating in the parking lots to search for food.

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5.4 Wildlife Species Listed/Observed During the Assessment – Birds

A total of 81 avian species were observed inside and outside KTVL during the 12-month wildlife assessment period (Table 2). The Avian Abundance Wildlife Table shows the number of avian wildlife abundance observations and the average size of each species in relation to the typical categories of small, medium, and large birds.

Title 40, Code of Federal Regulations, Part 33.76 classifies birds according to weight:

- Small birds weigh less than 3 ounces (oz.).
- Medium birds weigh more than 3 ounces and less than 2.5 pounds (lbs.).
- Large birds weigh greater than 2.5 lbs.

TABLE 2. AVIAN WILDLIFE ABUNDANCE TABLE

Species	Scientific Name	Alpha 4+ letter code	Abundance	Average size S, M, L
American coot	*Fulica americana*	AMCO	1987	M
American goldfinch	*Carduelis tristis*	AMGO	1	S
American kestrel	*Falco sparverius*	AMKE	3	S
American robin	*Turdus migratorius*	AMRO	718	S
American white pelican	*Pelecanus erythrorhynchos*	WHPE	55	L
barn swallow	*Hirundo rustica*	BARSW	20	S
black-backed woodpecker	*Picoides arcticus*	BBWO	1	S
black-billed magpie	*Pica pica hudsonica*	BBMA	103	M
black-headed grosbeak	*Pheucticus melanocephalus*	BHGR	3	S
blackburnian warbler	*Dendroica fusca*	BLWA	21	S
blue-winged teal	*Anas discors*	BWTE	8	M
brewer's blackbird	*Euphagus cyanocephalus*	BRBL	387	S
brown creeper	*Certhia americana*	BRCR	5	S
bufflehead duck	*Bucephala albeola*	BUFF	40	M
California gull	*Larus californicus*	CAGU	1019	M
Canada goose	*Branta canadensis*	CANG	838	L
canvasback duck	*Athya valisneria*	CANV	1	M
cliff swallow	*Petrochelidon pyrrhonota*	CLSW	6	S
common merganser	*Mergus merganser*	COME	1	M
common nighthawk	*Chordeiles minor*	CONI	1	S
common raven	*Corvus corax*	CORA	212	M
dark-eyed junco (Oregon)	*Junco hyemalis*	DEJU	114	S
Eurasian collared dove	*Streptopelia decaocto*	EUCD	109	S
European starling	*Sturnus vulgaris*	EU ST	49	S
evening grosbeak	*Coccothraustes vespertinus*	EVGR	201	S
Forster's tern	*Sterna fosteri*	FOTE	1	S
fox sparrow	*Passerella iliaca*	FOSP	18	S
gadwall duck	*Anas strepera*	GADW	17	M
golden eagle	*Aquila chrysaetos*	GOEA	4	L
great blue heron	*Ardea herodias*	GBHE	2	L
great egret	*Ardea alba*	GREG	1	L
great horned owl	*Bubo virginianus*	GHOW	3	L
greater scaup	*Athya marila*	GRSC	1	M
greater yellowlegs	*Tringa melanoleuca*	GRYE	1	M
hairy woodpecker	*Picoides villosus*	HAWO	2	S
horned lark	*Eremophila alpestris*	HOLA	76	S
house finch	*Carpodacus mexicanus*	HOFI	12	S
house sparrow	*Passer domesticus*	HOSP	6	S

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Species	Scientific Name	Alpha 4+ letter code	Abundance	Average size S, M, L
hummingbird spp.	*Trochilidae* spp.	HUMM	1	S
juniper titmouse	*Baeolophus ridgwayi*	JUTI	3	S
killdeer	*Charadrius vociferus*	KILL	27	S
lark bunting	*Calamospiza melanocorys*	LARB	4	S
long eared owl	*Asio otus*	LEOW	1	M
mallard duck	*Anas platyrhyncos*	MALL	199	M
mountain bluebird	*Sialia currucoides*	MOBL	132	S
mountain chickadee	*Poecile gambeli*	MOCH	33	S
mourning dove	*Zenaida macroura*	MODO	13	S
northern cardinal	*Cardinalis cardinalis*	NOCA	1	S
northern flicker	*Colaptes auratus*	NOFL	22	S
northern harrier	*Circus cyaneus*	NOHA	10	M
peregrine falcon	*Falco peregrinus*	PEFA	1	M
pine warbler	*Dendroica pinus*	PIWA	1	S
purple martin	*Progne subis*	PUMA	35	S
red-breasted merganser	*Mergus serrator*	RBME	27	M
red-breasted nuthatch	*Sitta canadensis*	RBNU	1	S
red-breasted sapsucker	*Sphyrapicus ruber*	RBSA	2	S
red-tailed hawk	*Buteo jamaicensis*	RTHA	30	M
red-winged blackbird	*Agelaius phoeniceus*	RWBL	169	S
ring-billed gull	*Larus delawarensis*	RBGU	311	M
rock dove	*Columba livia*	RODO	1	S
ruby-crowned kinglet	*Regulus calendula*	RCKI	2	S
savannah sparrow	*Passerculus sandwichensis*	SASP	9	S
sharp-shinned hawk	*Accipiter striatus*	SSHA	2	M
song sparrow	*Melospiza melodia*	SOSP	3	M
spotted sandpiper	*Actitis macularia*	SPSA	6	S
Steller's jay	*Cyanocitta stelleri*	STJA	365	S
tree swallow	*Tachycineta bicolor*	TRSW	6	S
tundra swan	*Cygnus columbianus*	TUSW	2	L
turkey vulture	*Cathartes aura*	TUVU	8	L
vesper sparrow	*Pooecetes gramineus*	VESP	3	S
western bluebird	*Sialia mexicana*	WEBL	17	S
western kingbird	*Tyrannus verticalis*	WEKI	1	S
western meadowlark	*Sturnella neglecta*	WEME	34	S
western sandpiper	*Calidris mauri*	WESA	51	S
western wood peewee	*Contopus sordidulus*	WWPE	12	S
white-crowned sparrow	*Zonotrichia leucophrys*	WCSP	110	S
white-headed woodpecker	*Picoides albolarvatus*	WHWO	1	S
willow flycatcher	*Empidonax traillii*	WIFL	2	S
wood duck	*Aix sponsa*	WODU	2	M
yellow warbler	*Dendroica petechia*	YEWA	2	S
yellow-rumped warbler	*Dendroica coronata*	YRWA	22	S

Note: The average size designations correlate to the three basic size groups of small, medium, and large-sized birds. The majority of the point counts were related to waterfowl (American coot, Canada geese, and mallards) migrations during the spring and fall. Other large counts were related to seasonal passerine migration (American robin, evening grosbeak), and resident or nesting icterids, corvids, and passerines. The table does not include reptile or mammal counts.

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5.4.1 Guilds

Animals with similar habitat requirements and behaviors can often be managed by similar techniques, which allow grouping them into guilds: "a group of species that exploit the same class of environmental resources in a similar way". Bird species observed during surveys were grouped into guilds and classified based on observed behaviors for each species during the assessment. The guilds described below generally correspond to traditional taxonomic categories, except where noted otherwise. Habitat use by birds overlaps among guilds.

Ravens, Jays, and Magpies (Corvids). Common ravens, Steller's Jay, and black-billed magpies are medium to large-sized birds inhabiting many cover types and are generally scavengers of natural forage and human garbage and/or predatory on small birds and mammals. Ravens, which regularly exceed 3 lbs. and 26 inches, are the largest species in the family Corvidae. Ravens were common around the Airport, Steller's jays are ubiquitous, and magpies were common in the residential areas around the Tahoe Keys Homeowners Association survey site.

Doves/Pigeons (Columbids). Mourning doves, Eurasian collared doves, and rock doves (also known as feral pigeons) are common smaller-sized birds, usually well established in urban areas and grasslands where they forage on seeds and insects. They are robust fliers and are often gregarious, grouping together in flocks. A few solitary mourning doves occurred on the Airport, and Eurasian collared doves were seen in residential areas.

Blackbirds/Starlings/Grackles (Icterids). Brewer's blackbirds, red-winged blackbirds, and starlings are small to medium-sized birds that are insectivorous and seedeaters or can be attracted to human garbage. They occurred in small groups (1-50 individuals) inside and outside the AOA. The Brewer's blackbirds and red-winged blackbirds nested in the heavy cover of the drainage ditches, the storm water pond, and perched on the Terminal and hangar buildings. A few starlings perched and were active around the Terminal and hangars.

Swallows. Barn, cliff, and tree swallows are small birds that typically form nesting colonies and fly erratically in fast-moving groups foraging on insects across the AOA and adjoining river floodplain. They tend to concentrate foraging where flying insects are attracted to the lights illuminating the Terminal and airfield. About 10 pairs of barn swallows arrived in late spring and nested on the south eaves of the Terminal and in the Terminal tunnel, with one nest under the eaves of the utility building facing the maintenance shed; however, on the west side of the Terminal building the netting effectively deterred swallow nesting. The barn swallows and other swallow species migrated in late summer and early fall. A common nighthawk, which has similar insectivorous foraging patterns, was seen on fall migration.

Sparrows/Larks/Flycatchers/Thrushes/Woodpeckers (Passerines). This guild includes sparrows and other sparrow-like or small passerine (perching) birds (such as American robin, western meadowlark, mountain bluebird, mountain chickadee, evening grosbeak, flycatchers, yellow-rumped warbler, yellow warbler, black-backed woodpecker, and northern flicker) that are primarily insectivores but also eat worms and invertebrates. Most of these birds are found solitarily or in pairs, perching on fences, posts or foraging on the ground.

Passerines include several small-sized species that may be semi-solitary or flocking. American robins migrated through the area and occurred in large flocks in spring and fall, foraging on terrestrial earthworms along the taxiways and runway. Sparrows are not usually associated with flocking except during migration periods. Because of their small size, these birds are generally not considered to be a serious hazard to aircraft unless they are moving in large groups/flocks. Although they do not flock traditionally, the birds form small groups that often moved together, and occasionally fly directly over or onto the main runway or taxiways. Sparrows were observed inside the AOA throughout the grass, wildflower, and shrub cover along the drainage ditch, and moving to and from the trees all over the AOA. Meadowlarks and bluebirds are small, sparrow-like birds that generally feed solitarily or in small groups and leave the area in winter. They feed primarily on seeds and small insects in short grasses. Upon being flushed from an area, these birds often initiate a triggering response that alerts other birds to combine in a larger erratically flying group. This reaction can pose a problem if it

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occurs near the Runway Safety Area (RSA). Included in this group, though not truly passerines, are the tree-climbing birds, e.g. woodpeckers. For the purposes of this assessment, sparrows, larks, and woodpeckers are generally categorized as small-sized birds.

Raptors/Vultures. This group comprises eagles, hawks, falcons, owls, and vultures. Raptors range in size from small to large birds and prey on small birds, insects, mammals, reptiles, amphibians, and fish. These birds are most often seen on structures and trees that offer the greatest visibility to the surrounding area. A few golden eagles were seen flying uncommonly over the AOA. Red-tailed hawks, northern harriers, and American kestrels were regularly observed flying over the Airport. Red-tailed hawks perched in the trees on the east side of the AOA and foraged over the AOA; northern harriers flew at very low elevations upwind and/or downwind on the AOA foraging for small rodents; and American kestrels made short foraging sorties across the airfield and perched on the runway and taxiway signage between hovering/foraging flights.

Turkey vultures were seen occasionally soaring on thermals over the forested hillsides south and east of the Airport. Their large size (4+ lbs.) and soaring flight characteristics (high and slow) are recognized as very hazardous to most aircraft, but they were rarely seen soaring over the Airport. These birds were, however, present in the traffic patterns and thus pose a significant hazard to aircraft.

Shorebirds/Wading Birds. Killdeer are sandpipers that are common on many airports. A few pairs nested in short grassy areas. They are usually solitary or in small groups and forage in the grassy areas in the AOA, and on taxiways and runways, feeding on invertebrates in wet ground ponds and low areas that collect rainwater or irrigation water. Killdeer tend to move in short, low flights so they are not generally considered a significant hazard. Great blue herons, a larger shorebird/wading bird, were seen foraging for aquatic species such as frogs occasionally in the drainage ditches in the AOA.

Geese and Ducks (Waterfowl)/Gulls (Larids) - Canada geese, mallards, American coots, other ducks, California and ring-billed gulls (family Laridae) are medium to large birds that feed on aquatic vegetation, insects, amphibians, fish, and other aquatic organisms.

Canada geese are migratory in spring and fall, and breed in the spring/summer at Lake Tahoe, where they are common on Lake Tahoe, the river and wet meadows in its floodplain, and at the golf course water hazards. They fly regularly in formations, generally in pairs or medium to large flocks, from the lake across the airport to destinations further west, and forage on the airport when green grass is available. Small groups of Canada geese (2-50 birds) were seen flying low over the Airport at elevations between 20 to 200 feet AGL (above ground level), mostly at dawn and dusk. These large birds may present hazards to aircraft in the vicinity of KTVL. They may also fly at extremely high altitudes during migrations. Pilots should use caution when flying near these large birds.

Groups of mallards (2-20 birds) were observed flying over the AOA at low altitudes, and foraging in a wet slough on the east side of the AOA near the V10 gate. Ducks were also observed in the river and lake outside the AOA. Mallards and most ducks fly at speeds between 40 to 60 mph. They usually migrate between altitudes of 200 to 4,000 feet, but are capable of flying much higher.

Ring-billed gulls and California gulls regularly roosted at Lake Tahoe and foraged at the city parks and shopping centers for discarded food items. Small groups of gulls were seen flying occasionally over the Airport.

5.5 Wildlife Species Common to the El Dorado County Region – Mammals

A total of 16 mammal species were observed or their presence was identified through tracks, scat, dens or burrows, trapping events, or identification of remains during the 12-month assessment period (Table 3).

Coyotes were the most frequently occurring predator and were seen regularly on the AOA. Black bears are omnivorous and easily attracted to garbage. At least one sow black bear and 2-3 cubs were active in the area during the WHA, where they were attracted to available dumpsters, and climbed over the AOA fence a few times at either the Kyburz Road gate or by the FBO.

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Several small mammal species such as mice, chipmunks, pocket gophers, ground squirrels, and tree squirrels that are prey species for coyotes and various raptors were common on the AOA.

A small unidentified bat was observed foraging in the illumination of the lights at the Terminal and over the river floodplain, and could have been one of several species of bats that occur regionally; they are a nighttime hazard.

TABLE 3. MAMMALS OBSERVED DURING LAKE TAHOE AIRPORT WILDLIFE HAZARD ASSESSMENT

Species	Scientific Name	Observations
American badger	*Taxidea taxus*	possible den
bat spp.	*Chiroptera* spp.	common
beaver	*Castor canadensis*	common
black bear	*Ursus americanus*	common
black-tailed hare	*Lepus californicus*	occasional
coyote	*Canis latrans*	common
deer mouse	*Peromyscus maniculatus*	common
Douglas squirrel	*Tamiasciurus douglasii*	common
golden-mantled ground squirrel	*Spermophilus lateralis*	common
mountain pocket gopher	*Thomomys monticola*	common
least chipmunk	*Tamias minimus*	common
yellow pine chipmunk	*Tamias amoenus*	common
mountain cottontail	*Sylvilagus nuttallii*	common
muskrat	*Ondatra zibethicus*	common
raccoon	*Procyon lotor*	common
western gray squirrel	Sciurus griseus	common

Note: Scientific names sourced from: Schlesinger, M. D. and J. S. Romsos. (no date). "Vertebrate species of the Lake Tahoe Basin"; Appendix G in the Lake Tahoe Watershed Assessment.

5.6 Wildlife Species Common to El Dorado County – Herpetofauna

Reptiles and amphibians common to El Dorado County and possibly occurring in the area around the Airport are listed in Table 4. These species, except bullfrog and mountain yellow-legged frog, were not confirmed during the assessment period, but the California Diversity database lists them as present in El Dorado County, and these animals, where present, may be a forage source for raptors, great blue herons, and other birds.

TABLE 4. EL DORADO COUNTY AREA REPTILES AND AMPHIBIANS

Species	Scientific Name
bullfrog	*Rana catesbeiana*
common garter snake	*Thamnophis sirtalis*
long-toed salamander	*Ambystoma macrodactylum*
mountain yellow-legged frog	*Rana muscosa*
northern alligator lizard	*Elgaria coerulea*
Pacific treefrog	*Hyla regilla*
rubber boa (exotic)	*Charina bottae*
sagebrush lizard	*Sceloporus graciosus*
southern alligator lizard	*Elgaria multicarinata*
western fence lizard	*Sceloporus occidentalis*
western toad	*Bufo boreas*
western aquatic garter snake	*Thamnophis couchii*
western terrestrial garter snake	*Thamnophis elegans*

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5.7 Plant Species Common to El Dorado County

The lower montane plant community is comprised of conifer, aspen, and other locally common trees, various shrubs, and many species of grass and wildflowers. Several Threatened and/or Endangered Species (TES) plants occur locally, such as Tahoe yellow cress (*Rorippa subumbellata*), which was seen at the shoreline by the Tahoe Keys Homeowners Association pier. Any areas to be treated with herbicides or other management techniques should be assessed to confirm that TES plants are not present.

Many plants are listed as invasive weeds by federal, state, or local land management authorities and it is recommended that they be controlled to achieve regional land management guidelines. At the Airport, bull thistle (*Cirsium vulgare*) and white pepperweed (*Lapidium latifolium*), were common on the AOA and should be controlled through herbicide applications before the plants flower and set seed. Both of these species are prolific producers of seeds that are wildlife attractants to seed-eating birds and mammals.

5.8 Daytime Wildlife Observations

Daytime (morning and mid-day), evening, and night monitoring was included as part of the overall assessment at observation points on the Airport and at offsite locations. Approximately 80 percent of the total counts occurred during the day, and 20 percent of the total counts occurred during evening and night time monitoring (Figure 15).

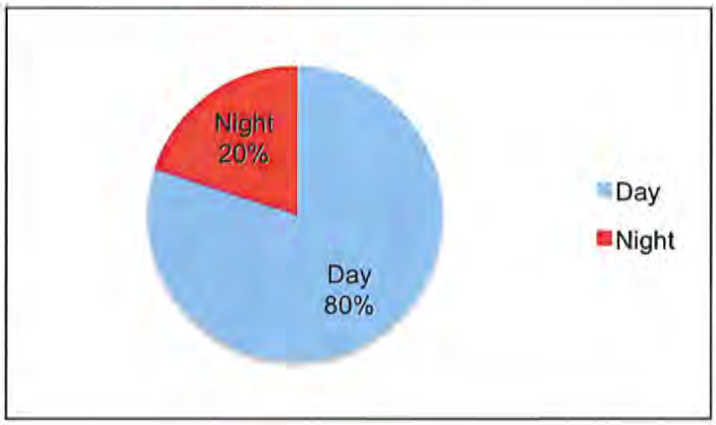

FIGURE 15. PERCENT WILDLIFE OBSERVATIONS IN DAYTIME AND NIGHTTIME

Daytime wildlife observations were conducted during dawn, midday, and sunset periods. Daytime surveys included visual observations and the use of wildlife cameras capable of capturing digital images of wildlife activity during the day. Wildlife activity levels were highest from early morning until midday. Activity was usually low during midday then increased near sunset, except when harsh weather conditions caused activity levels to decrease.

5.9 Night Wildlife Observations

Night wildlife observations, which included visual observations, night spotlight surveys that were randomly used throughout the study, and infrared wildlife cameras capable of capturing digital images of wildlife activity at night, were conducted after sunset and in the late evening periods.

5.10 Wildlife of Most Hazardous Concern to Airport Operations at KTVL

The FAA developed a database of hazardous wildlife strikes and the relationship to a prioritized risk assessment with respect to aircraft safety. The FAA's risk-based analysis evaluated all reported wildlife strikes to civil aircraft in the United States from 1990 through 2013. From this analysis, the mean hazard level and hazard level rankings of the 30 species of birds most frequently struck by civil aircraft from 1990 through 2013

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were established (Table 5). Note the footnote on the table that indicates more birds of each species were struck, because only 38% of strikes were reported to species between 1990-2013 and, despite improved reporting, only 60% of strikes were reported to species in 2013.

The FAA Wildlife Strike Database for KTVL lists only four strikes, but these hit the #1 – mourning dove, #8 – red-tailed hawk, and #17 – duck (probably mallards) most hazardous species listed for the 23-year period on Table 5. The fourth strike was "small bird" – most likely a passerine species but indeterminate from the report. The Wildlife Hazard Assessment field observations showed that coyotes, and large (Canada goose, turkey vulture, golden eagle), medium-sized (mallard, red-tailed hawk, common raven), and smaller (American robin, mountain bluebird, killdeer, mourning dove, Brewer's blackbird, red-winged blackbird, and starling) birds in the various avian guilds could be responsible for potentially hazardous and damaging conflicts with aircraft at the Airport.

TABLE 5. TOP 30 AVIAN WILDLIFE STRUCK BY AIRCRAFT

Table 5— The 30 species of birds identified most frequently as struck by civil aircraft in USA, 1990-2013 and 2013 only.

	Strikes (1990-2013)[1]			Strikes (2013 only)[1]		
Rank	Bird species	Number	% causing damage	Bird species	Number	% causing damage
1	Mourning dove	6,124	3	Mourning dove	752	1
2	American kestrel	3,593	1	Barn swallow	504	<1
3	Killdeer	3,369	1	Horned lark	479	<1
4	European starling	3,348	3	Killdeer	442	<1
5	Barn swallow	2,863	<1	American kestrel	352	0
6	Horned lark	2,669	1	European starling	281	2
7	Rock pigeon	2,514	9	Eastern meadowlark	228	1
8	Red-tailed hawk	1,874	15	Red-tailed hawk	215	15
9	Canada goose	1,470	50	Rock pigeon	179	4
10	Ring-billed gull	1,296	8	Cliff swallow	165	0
11	Eastern meadowlark	1,182	1	American robin	107	7
12	Herring gull	1,065	10	Ring-billed gull	101	8
13	Barn owl	959	4	Western meadowlark	91	0
14	Cliff swallow	941	<1	Common nighthawk	84	0
15	Pacific golden-plover	805	1	Savannah sparrow	76	1
16	W. meadowlark	778	1	Barn owl	72	1
17	Mallard	749	23	Canada goose	68	44
18	American robin	689	7	Herring gull	67	10
19	Turkey vulture	537	52	Tree swallow	62	2
20	Tree swallow	474	<1	Chimney swift	62	0
21	Short-eared owl	408	2	Mallard	59	20
22	Common nighthawk	404	1	Pacific golden-plover	52	4
23	American crow	395	8	Turkey vulture	49	55
24	Laughing gull	384	5	Short-eared owl	49	0
25	Chimney swift	328	2	Bank swallow	44	0
26	Great blue heron	326	21	Red-winged blackbird	43	0
27	Savannah sparrow	314	1	Snowy owl	38	11
28	Cattle egret	290	9	Yellow-rumped warbler	35	0
29	Zebra dove	274	1	Snow bunting	34	3
30	Bank swallow	271	1	Western kingbird	31	6

[1] Actual number struck was higher for each species because only 38% and 60% of the bird strike reports from 1990-2013 and in 2013, respectively, identified the bird to species.

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From the data in Table 5, the top 10 avian species with the highest strike risk on Table 5 were observed at KTVL. These are, in descending order: mourning dove; American kestrel; killdeer; European starling; barn swallow, horned lark; rock pigeon; red-tailed hawk; Canada goose; and ring-billed gull. Based on the total number of observations of each of these species, the cumulative total of 2,387 observations (including ring-billed and California gull, the locally common gull species) equates to 31% of the total observations of all recorded avian species during the assessment period. Western meadowlark, mallards, American robin, turkey vulture, common nighthawk, great blue heron, and savannah sparrow were also on the top 30 list; included on the 2013 list only were red-winged blackbird, yellow-rumped warbler, and western kingbird.

Very few columbids were present on the AOA. Corvids were present all year and had concentrated activity over the winter months when they were scavenging for food. Icterids and starlings nested in spring and had a migratory passage in September. Peak passerine migrations occurred in April and September, and some nested during spring and summer. A few barn swallows bred on site, but large migrations were not observed. Raptors and turkey vultures were present regularly. Killdeer were the primary shorebird and were observed singularly or in small groups foraging on the AOA. Killdeer's risk ranking is based on their small size and occasionally high population densities, particularly around the open fields on airports. Waterfowl observations were high in the spring and fall migrations. The chart below shows avian population activity levels for observation points inside the AOA over the 12-month assessment period (Figure 16).

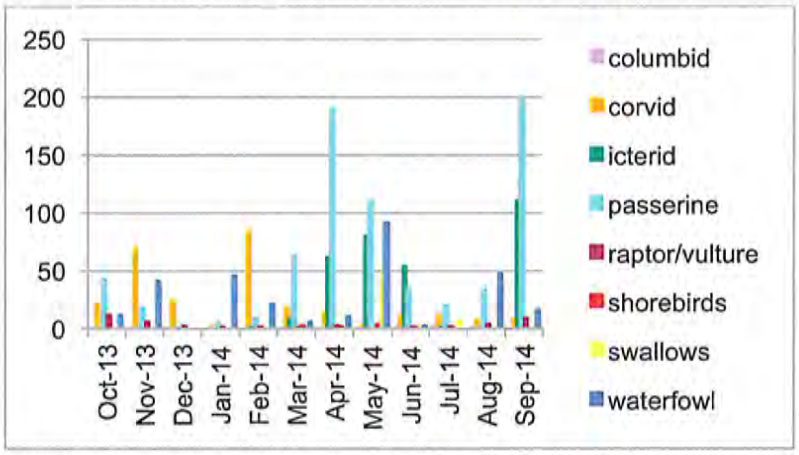

FIGURE 16. MONTHLY AVIAN POPULATION ACTIVITY LEVELS INSIDE THE AOA

Avian activity observations outside the AOA were dominated by waterfowl and passerine migrations (Figure 17). Notably, a few groups of American white pelicans and several tundra swans, both large hazardous waterfowl species, were seen on Lake Tahoe during migration. Corvids were ubiquitous around commercial and residential areas. Icterids and starlings were active during spring, summer, and early fall. Raptors were observed rarely in residential areas. The few shorebirds (sandpipers and killdeer) were concentrated along the shoreline at Lake Tahoe. Swallows were very uncommon, although some nested under the Tahoe Keys pier.

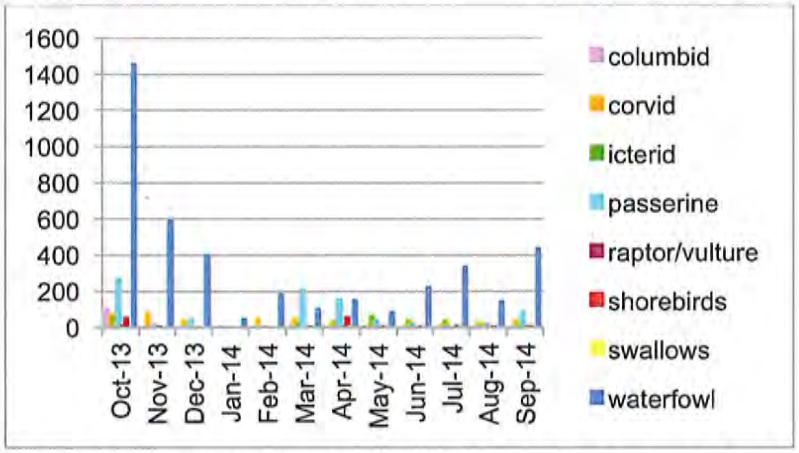

FIGURE 17. MONTHLY AVIAN POPULATION ACTIVITY LEVELS OUTSIDE THE AOA

Table 6 shows the relationship between wildlife size and loss records of civilian aircraft as a result of a wildlife strike relative to aircraft mass where the aircraft was damaged beyond repair or destroyed as reported in the

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FAA database from 1990 through 2013. Although mule deer were not observed on or around KTVL at any time during the assessment period, because of animal size, they can cause significant aircraft losses. With respect to damaging strikes on civilian aircraft, Canada geese were third; turkey vultures were fifth, followed by eagles, hawks, rabbits, and coyotes. Each of the above species, except mule deer, was observed and reported on or around KTVL during the assessment.

Table 6. THE RELATIONSHIP BETWEEN WILDLIFE SIZE AND LOSS RECORDS OF CIVILIAN AIRCRAFT

Number of civil aircraft lost (destroyed or damaged beyond repair) after striking wildlife by wildlife species and aircraft mass category, USA, 1990–2013[1].

Wildlife species or species group	Aircraft[2] mass category (Maximum takeoff mass) ≤2,250 kg	2,251-5,700 kg	5,701-27,000 kg	>27,000 kg	Total aircraft lost
White-tailed deer	14	6	2		22
Unknown bird	11	2	2		15
Canada goose	1	3		1	5
Cattle	2	1			3
Turkey vulture	3				3
Bald eagle	2				2
Hawks	2				2
Eastern cottontail	1				1
Coyote			1		1
Domestic dog	1				1
Mule deer	1				1
Wapiti (elk)			1		1
Brown pelican	1				1
A. white pelican		1			1
D.-crested cormorant	1				1
Ducks	1				1
New World Vultures	1				1
Red-tailed hawk		1			1
Eurasian kestrel				1	1
Ring-billed gull		1			1
Mourning dove			1		1
Total	**42**	**15**	**7**	**2**	**66**

[1] Forty three (64 percent) of the 66 wildlife strikes resulting in a destroyed aircraft occurred at general aviation airports, 15 occurred "enroute", 6 occurred at USA airports certificated for passenger service under 14 CFR Part 139, and 2 occurred at a foreign airport certificated for passenger service.

[2] Engine types on the 66 destroyed aircraft were piston (48), turbofan (7), turboprop (5), turbojet (3), and turboshaft (3). Aircraft operators were business (37), private (23), commercial transport (5), and Government (1).

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5.11 AOA Observation Points

Avian guilds and mammal counts were analyzed for each of the six primary observation points (OP-1 through OP-6) inside the AOA. Each observation point had slight differences in dominant wildlife activity, although many species were ubiquitous in the AOA.

Observation point OP-1 was located at the Terminal and hangars (Figures 18, 19, 20). This area includes the Terminal parking lot, the entrance road to the Airport, and the FBO. Starlings, Brewer's blackbirds, ravens, Steller's jays, passerines, and swallows were common.

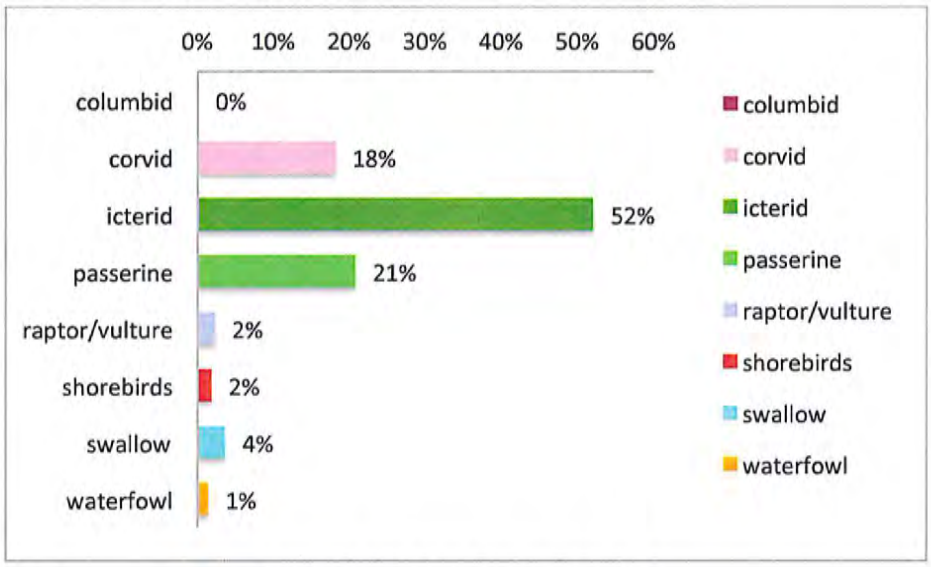

FIGURE 18. OBSERVATION POINT OP-1

FIGURE 19. BARN SWALLOW NEST ON SOUTH EAVE OF TERMINAL BUILDING

FIGURE 20. STARLINGS ROOSTING ON A HANGAR

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Observation point OP-2 was located along the southwestern side of the AOA on the access road overlooking the south approach (Figures 21, 22, 23). Wildlife observations were primarily Steller's jays, American robins, and sparrows, coyotes (tracks), and a few chipmunks. One pair of red-winged blackbirds nested in the stormwater pond. The fence is in poor repair in this area, and trees and shrubs are growing through or over the fence. Several breaches are present under the fence, even where chain-link has been extended and buried in the dirt.

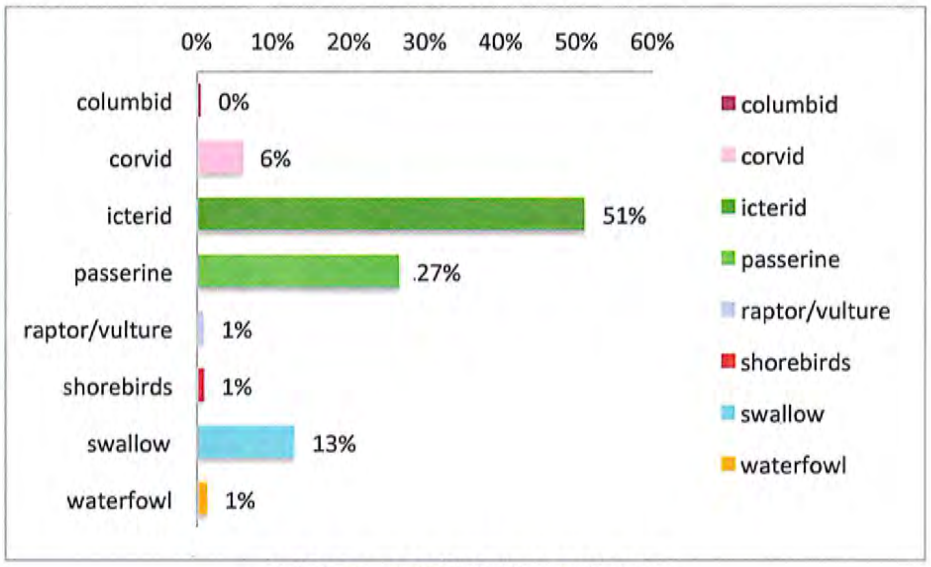

FIGURE 21. OBSERVATION POINT OP-2

FIGURE 22. NESTING RED-WINGED BLACKBIRD

FIGURE 23. COYOTE TRACKS ON PERIMETER FENCE

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Observation point OP-3 was located at the south end of the runway (Figures 24, 25, 26). Coyotes transitioned across the AOA into the west hillside by the perimeter fence. The bird guilds were dominated by passerines (sparrows, American robin, dark-eyed junco, Steller's jays and occasional northern flickers). Waterfowl (Canada geese and mallards) flew in both directions over the AOA. Raptor foraging was low because of the heavy shrub and grass cover.

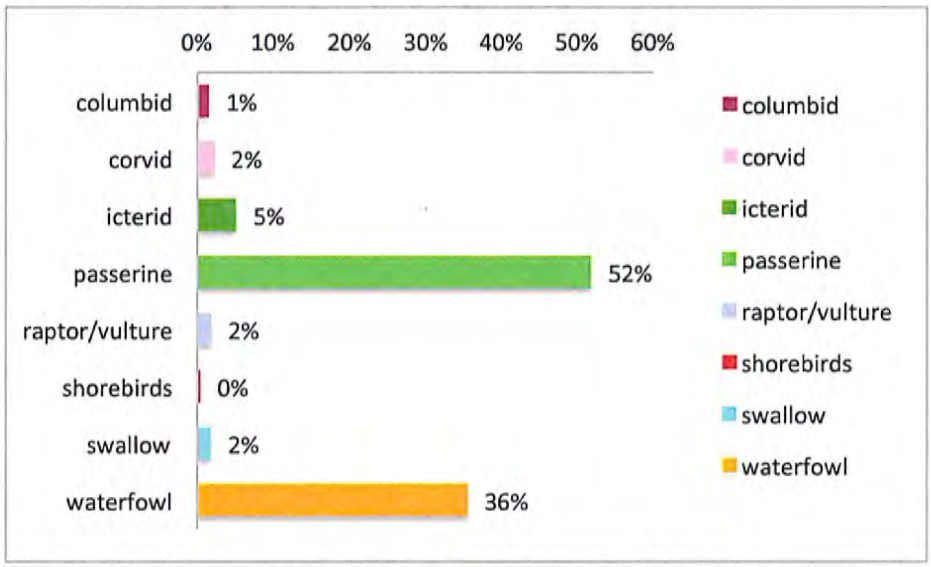

FIGURE 24. OBSERVATION POINT OP-3

FIGURE 25. COYOTE CROSSING THE AOA / WEST TAXIWAY AT APPROACH RUNWAY 36 / SOUTH END OF AOA

FIGURE 26. ADULT AND JUVENILE MOUNTAIN BLUEBIRDS SITTING ON TAXIWAY LIGHTS

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Observation point OP-4, at the east side of the AOA, had bunch grass and shrub cover. Coyotes hunted through the area, and Canada geese regularly transitioned in continuing south over the Airport at about 100 feet AGL, or descended to forage on the airport grass (Figures 27, 28, 29). Raptors regularly hunted the area.

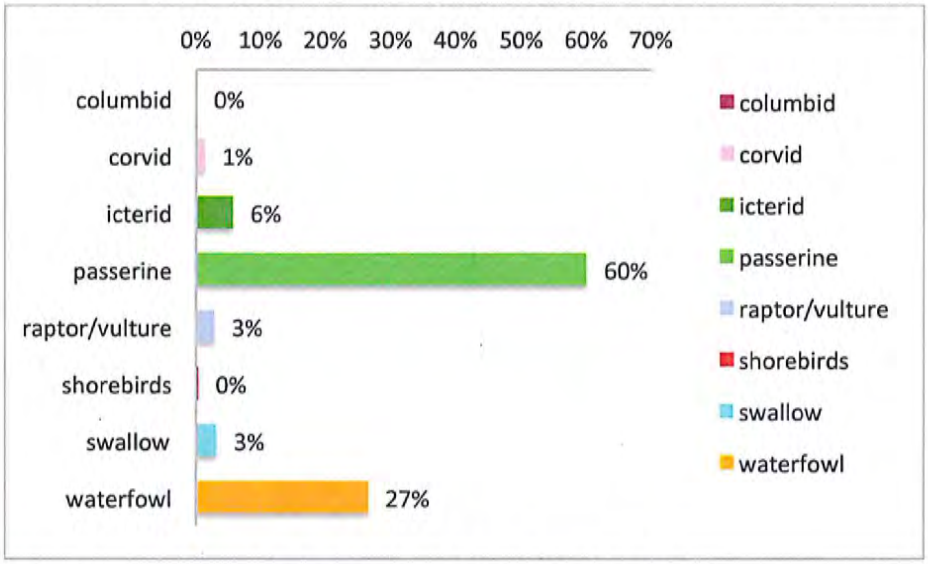

FIGURE 27. OBSERVATION POINT OP-4

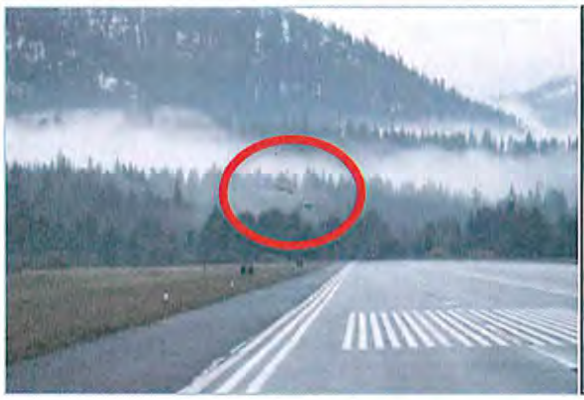

FIGURE 28. CANADA GEESE FLYING SOUTH ON THE RUNWAY

FIGURE 29. CANADA GEESE LANDING ON THE EDGE OF THE RUNWAY

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Observation point OP-5 was located at the north end of Runway 18, and over-flights of Canada geese or mallards were observed regularly (Figures 30, 31, 32). Passerines, icterids/starlings/grackles, and columbids were also observed foraging, perching, and loafing in the tall grasses and trees. Coyotes transitioned from the hillside across the approach Runway 18 and muskrat were active in the drainage ditch.

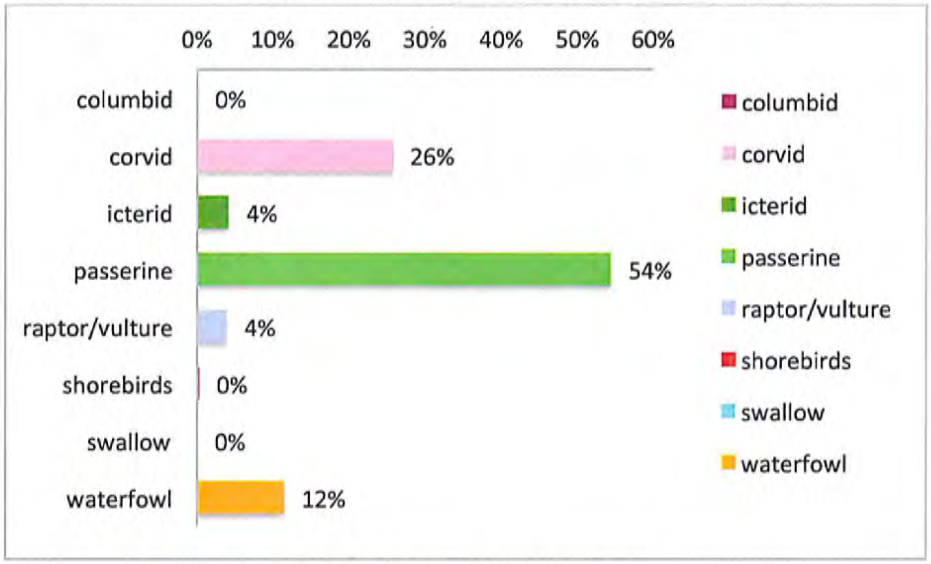

FIGURE 30. OBSERVATION POINT OP-5

FIGURE 31. COYOTE CROSSING THE AOA AT APPROACH RUNWAY 18

FIGURE 32. MUSKRAT TRAIL IN THE DRAINAGE DITCH

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Observation point OP-6 was situated at the north end of the FBO apron overlooking the north end of the airport and drainage ditch (Figures 33, 34, 35). Waterfowl landed in the ditch as they flew over the AOA north to Lake Tahoe or south to the Lake Tahoe Golf Course. Passerines (sparrows, dark-eyed juncos, American robin), Steller's jays, raptors, and mammals (Douglas squirrels and chipmunks) were common in the area.

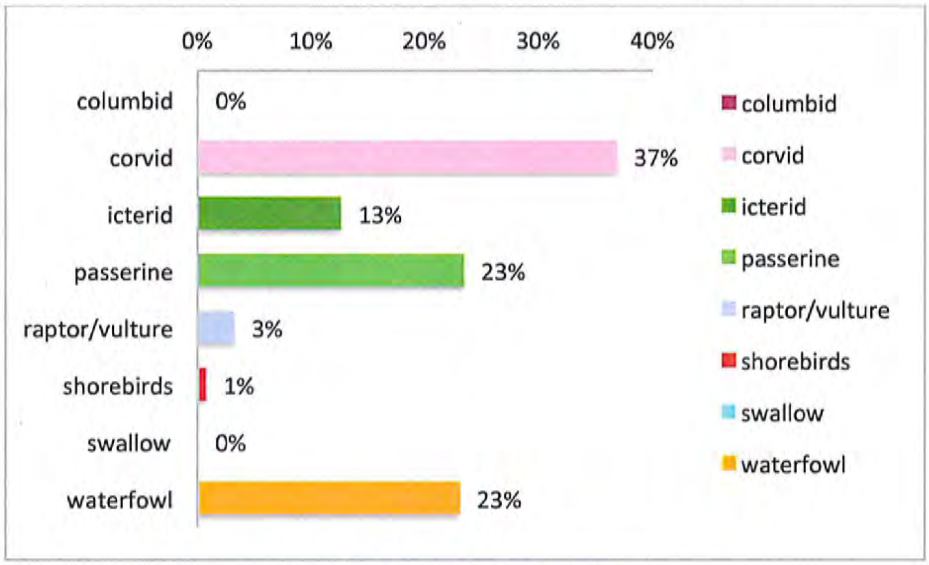

FIGURE 33. OBSERVATION POINT OP-6

FIGURE 34. SOARING RED-TAILED HAWK (WESTERN PLUMAGE)

FIGURE 35. SAVANNAH SPARROWS FORAGING IN BUNCH GRASS

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5.12 Description of Wildlife Hazards Inside the AOA

Raptors. Red-tailed hawks, northern harriers, and American kestrels hunted commonly on the AOA. The red-tailed hawks were present in all seasons and but were less active when snow cover was present, because prey was less active and available. Northern harriers were seen occasionally hunting over the low grass on the median. One to two pairs of American kestrels nested locally. Turkey vultures soared through the airspace periodically but were not resident on the Airport (Figure 36). CALSTAR staff reported a larger owl (probably a barred owl) in the trees above their office. A great grey owl was seen once crossing the AOA at a low altitude.

FIGURE 36. RAPTOR FORAGING AREAS

FIGURE 37. PASSERINE CONCENTRATION AREAS

Passerines. Sparrows (savannah, white-crowned, white-throated, etc.), robins, meadowlarks, and mountain bluebirds were commonly distributed across the AOA and sparrows and robins roosted in the trees across the AOA (Figure 37). The small passerines generally did not congregate into groups or flocks and were a minimal hazard. The few swallows that nested on the Airport did not congregate into wheeling flocks to become a hazard to aircraft. Occasional small groups of Brewer's blackbirds (50 birds) and starlings (20 birds) were present by the hangars and the drainage ditches, and on at least one occasion (Lake in the Sky Air Show) the Brewer's blackbirds were a potential hazard and were hazed with pyrotechnics. The other species foraged on the AOA when the soil was moist foraging for seeds and insects in the grasses, primarily along the east side of the runway and the northwest side of the taxiway.

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When flushed by a vehicle or aircraft they flew in small, scattered groups in low, erratic patterns, generally towards the perimeter areas, which could result in an aircraft strike or engine ingestion. They are poorly visible until a vehicle or aircraft is very close to them.

Waterfowl. Canada geese and mallards flying over the airport to and from Lake Tahoe are poorly visible until they are on the AOA, due to the longer sight distances down the valley and the heavy tree cover surrounding the airport and encroaching on the AOA. The runway is fairly level: the 13 foot change in elevation from the approach end of Runway 18 (elev. 6,251 feet) to the higher elevation at the approach end of Runway 36 (elev. 6,264) does not impair the clear line of sight down the runway, but the north end transitions into wooded floodplain and the south end into forest which restricts the visibility to see oncoming birds in the area of approach or departure (Figure 38).

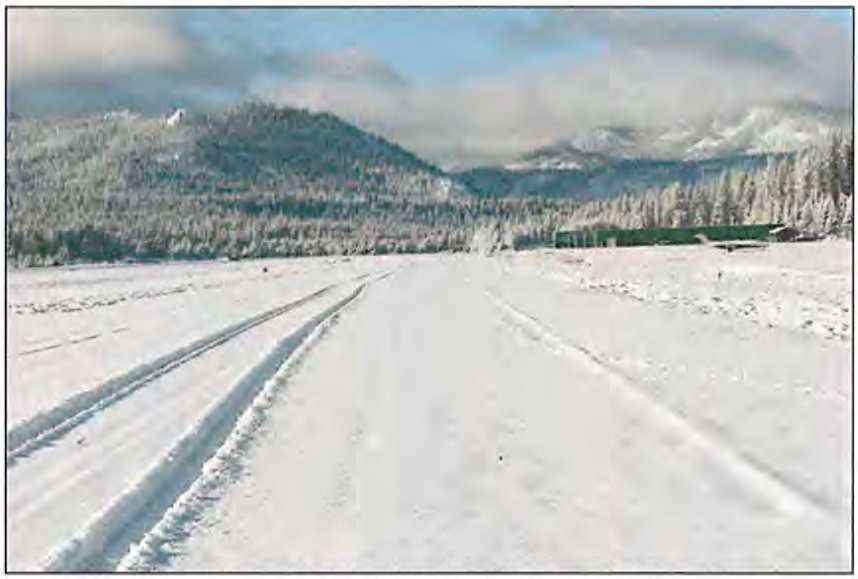

FIGURE 38. VIEW SOUTH ON THE RUNWAY

Mammals. Coyotes and black bears are the large mammals commonly seen on the Airport. Mule deer were not observed on the AOA and Operations staff reported that they are rarely seen in surrounding forests. Coyotes were actively hunting during all seasons on the AOA, and in the adjacent floodplain. Coyote scat was observed regularly at several locations along paved areas in the AOA, and their tracks were followed after snowstorms. Several ingress/egress sites were located along the perimeter fence. Coyotes commonly have a relatively high ranking with respect to Effect On Flight (EOF) because pilots often see these animals and may abort landing or take off. When coyotes are struck, they often result in expensive damage to aircraft.

Black bears were documented in all seasons, as at least one adult sow bear and two or three cubs did not hibernate in the 2013-2014 winter. The AOA fence or the horizontal outriggers with barbed wire did not impede black bears. They were observed and photographed climbing over the fence at the Kyburz gate, behind the hangars, and at the FBO fence, where they were attracted to the dumpsters at the Terminal and FBO (Figure 39). Their activity was focused on the dumpsters and they were not observed roaming onto the taxiways and runway.

Trapping for large mammals (snares or large live traps) was not conducted because numerous large mammal (primarily coyote) ingress/egress/breach locations under the fence were obvious. Several other species of mid-sized mammals occur such as mountain cottontails, muskrats, beaver, Douglas squirrels and yellow pine chipmunks that are hunted by coyotes. Very few mountain cottontails were observed, perhaps as a result of

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drought conditions and lack of forage on the Airport. Muskrats are aquatic mammals and were active in the drainage ditches.

FIGURE 39. BEAR CUB CLIMBING OVER THE PERIMETER FENCE ON THE HORIZONTAL OUTRIGGERS BY THE FBO (PHOTO: JOE SINGER)

FIGURE 40. SMALL MAMMAL TRAP AREAS

Small Mammal Trapping Summary

Approximately ten species of "small mammals" (mice, shrews, voles, chipmunks, pocket gophers, etc.) that are important raptor and carnivorous mammal prey items occur in the Tahoe Basin. Small mammals were sampled by trapping (100 trap-nights at five representative locations where small mammals were likely to be attracted to cover or foraging areas) during the summer (June) and fall (September). Trap areas were designated as SMTA1 through SMTA5 (Figure 40).

Sixteen small mammals, deer mice (*Peromyscus maniculatus*) and a chipmunk (*Tamias amoenus*), were caught in the traps (16% catch-per-trap night) combined in both seasons. The catch-per-unit effort by season was 8 mice and 1 chipmunk captured in June, and 7 mice captured in September. Other small mammals, such as pocket gophers, were identified but were not trapped during the trapping events.

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5.13 External Observation Points

Seasonal wildlife activity varies from year to year and may result in avian and mammalian concentration shifts from outside to inside the AOA. Avian guilds and mammal counts were also analyzed for each of the five observation points (XP-1 through XP-5) outside the AOA. The external observation points were specifically selected as different potential wildlife attractant areas.

Observation point XP-1 was in the Upper Truckee River floodplain on the east side of the river, adjacent to a residential area. The most numerous birds were passerines (white-crowned and song sparrows, a large flock of migrating black-headed grosbeaks, one white-headed woodpecker, chickadees, titmice, willow flycatcher), Steller's jays, and waterfowl (mallards and red-breasted mergansers) in the river (Figure 41). Mammals observed were Douglas squirrels and chipmunks, and cuttings from beaver foraging on willows.

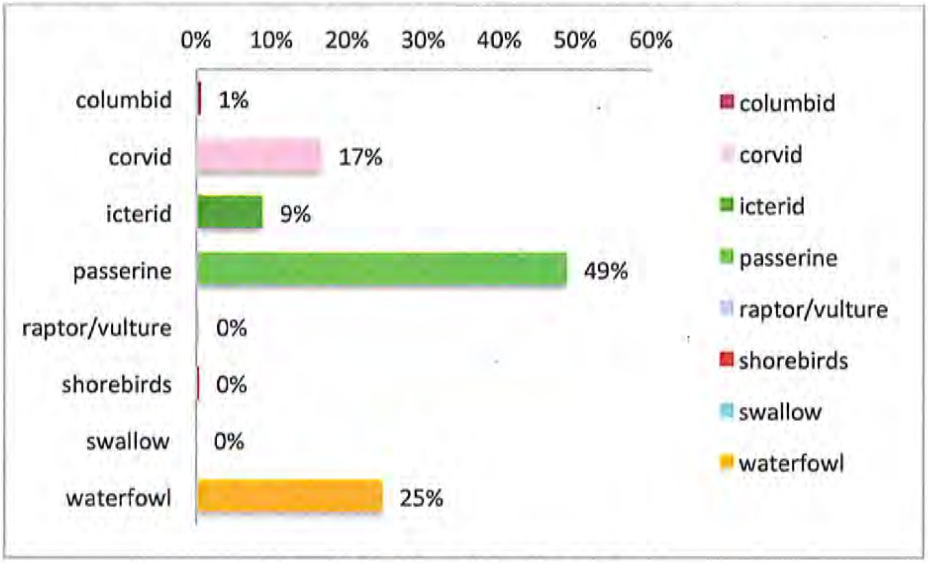

FIGURE 41. OBSERVATION POINT XP-1

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Observation point XP-2 was on the bicycle trail bridge over the Upper Truckee River at the end of Ponderosa Street on the north side of the river. The floodplain was densely vegetated with willows, and the riverbanks above the riparian zone were covered with Jeffrey pines and other conifers. The most numerous birds were passerines (white-crowned and song sparrows, black-backed woodpecker, chickadees, and titmice), Steller's jays, and waterfowl (mallards and red-breasted mergansers) in the river; Douglas squirrels and chipmunks were numerous (Figure 42).

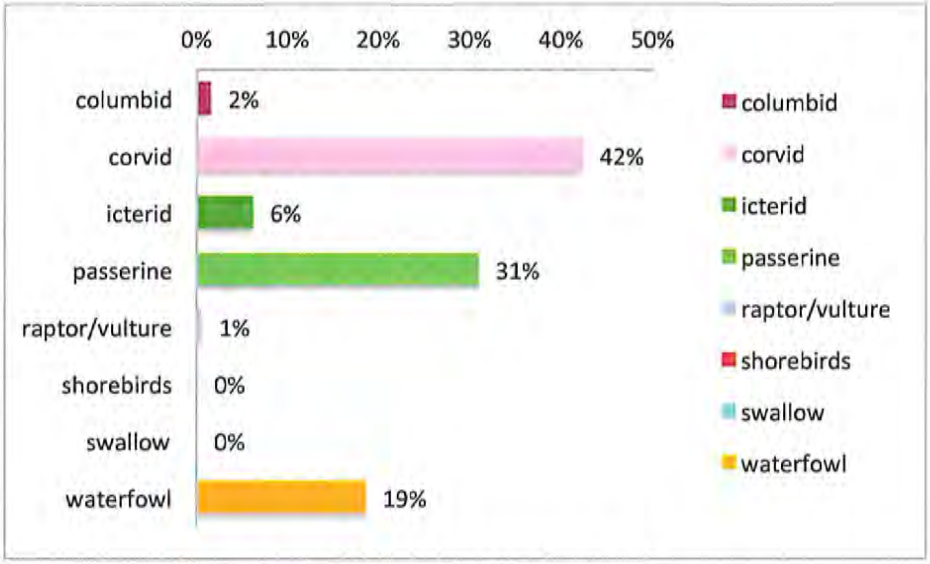

FIGURE 42. OBSERVATION POINT XP-2

Observation point XP-3 was at the edge of the Upper Truckee River adjacent to the parking lot on Elk Grove Road, approximately 1 mile southwest of the approach to Runway 36. This area had high disturbance from daily recreational activity and dog walking on the trail and the weekly flea market. The most dominant guilds were passerines (dark-eyed juncos, chickadees, titmice), Steller's jays, and waterfowl (mallards) in the river (Figure 43).

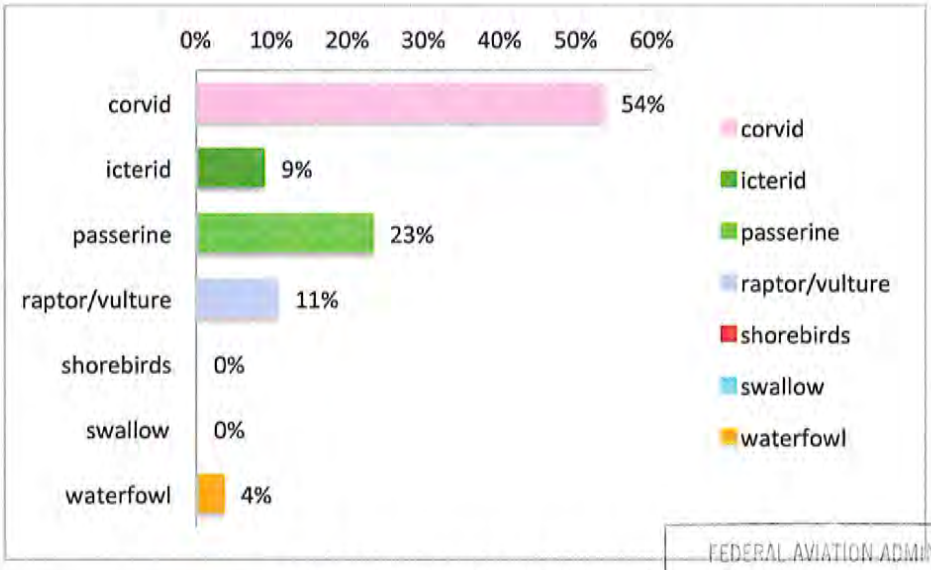

FIGURE 43. OBSERVATION POINT XP-3

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Observation point XP-4 was adjacent to the east side of the highway, overlooking the Sunset Stables Reach 5 Restoration Project area and the Airport, approximately 0.5 miles west of the approach to Runway 36. Very little wildlife activity occurred here. The dominant guilds were passerines (sparrows, and dark-eyed juncos), Steller's jays, and small mammals (Douglas squirrels and chipmunks) (Figure **44**).

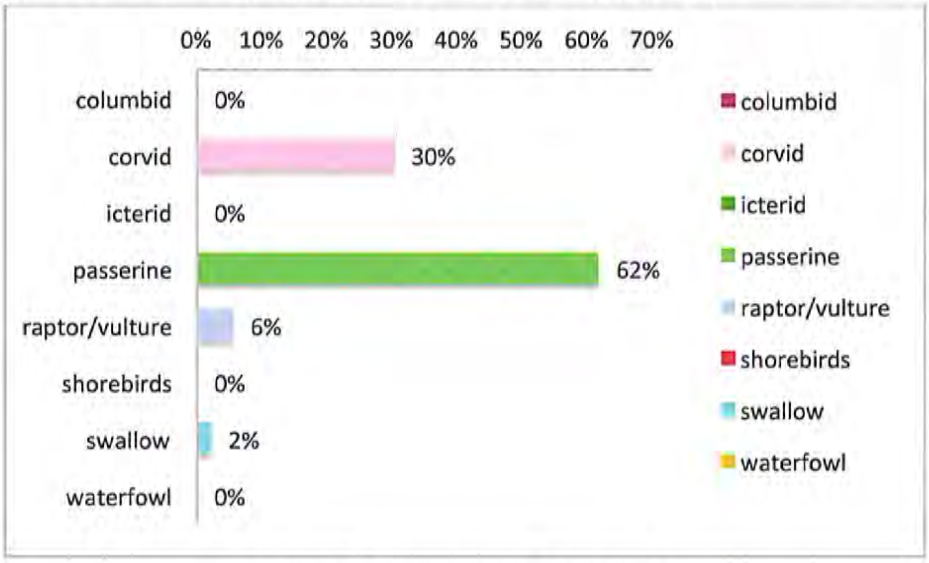

FIGURE 44. OBSERVATION POINT XP-4

Observation point XP-5 was at the Tahoe Keys Homeowners Association pier in Lake Tahoe, approximately 3 miles north of approach Runway 18. From the pier, wildlife could be observed on the lake shoreline and open water, and around the canals. The most numerous birds in the residential area were passerines (dark-eyed juncos, American robins, red-breasted sapsucker), columbids (Eurasian collared doves and mourning doves), and corvids (Steller's jays black-billed magpies and ravens). On the shoreline and open water, waterfowl (Canada geese, American coots, and red-breasted mergansers) and larids (ring-billed gulls, California gulls), were numerous. American white pelicans and tundra swan were seen on migration (Figure 45).

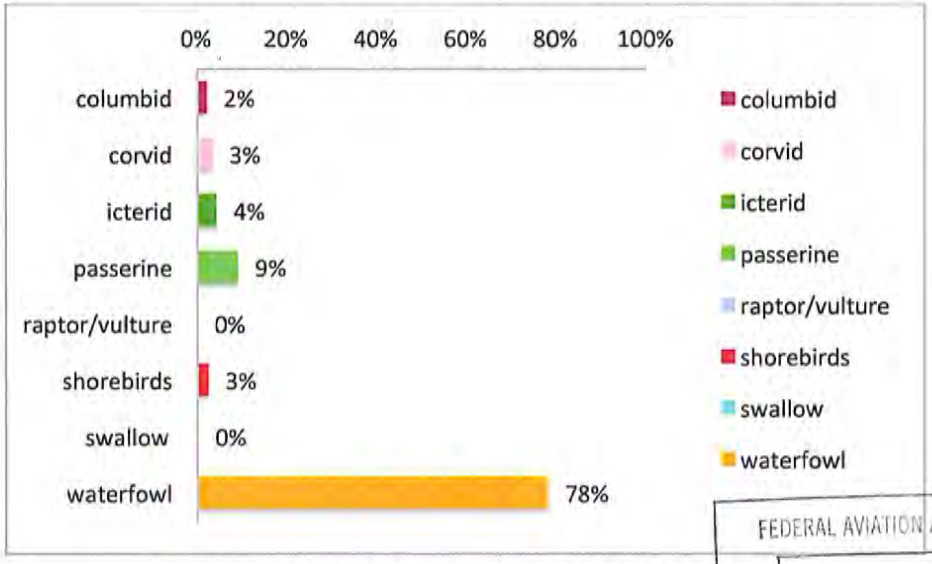

FIGURE 45. OBSERVATION POINT XP-5

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5.14 Description of Wildlife Hazards Outside the Airport

Columbids. Low numbers of Eurasian collared doves and mourning doves were scattered in residential areas and the river floodplain.

Corvids. Large groups of common ravens aggregated around the shopping centers to scavenge for food, and were common in forested areas. Steller's jays were common in forested and residential areas. Black-billed magpies were common around the Tahoe Keys Marina.

Icterids. Small groups of starlings, Brewer's blackbirds, and red-winged blackbirds were common in shopping centers and residential areas.

Passerines. Migratory and resident passerines were widely distributed outside the Airport in residential landscaping and forested areas. A large migrating group of black-headed grosbeaks were observed in the river floodplain. Various other species can form large groups or flocks during migration or when transitioning to a different foraging area or moving to a day or night roost.

Raptors/Vultures. Raptors (primarily red-tailed hawks) and turkey vultures were present in low numbers hunting over the river floodplain. They are potential hazards to aircraft while soaring, hunting, or transitioning and can climb to high altitudes where they are virtually invisible to pilots.

Shorebirds. Small groups of killdeer and a few solitary sandpipers were seen on the Lake Tahoe shoreline.

Swallows. Barn swallows were seen in low numbers foraging over the river's floodplain and were a low threat because they were present in such low numbers.

Waterfowl. Canada geese, mallards, and other ducks were present in large numbers during migration. Geese and mallards nested around Lake Tahoe and were present from spring to fall, presenting a constant hazard as they moved in the river floodplain. A few American white pelicans and tundra swans were seen as they moved seasonally to and from the Lake Tahoe area on migration. The limited visibility on all sides of the Airport will require diligent monitoring to alert pilots to waterfowl movements in this area.

Mammals. Black bears and coyotes are free ranging outside the AOA and transition easily onto the AOA to forage. Scattered populations of rabbits, rodents, etc. provide forage for raptors, vultures, and carnivorous mammals.

6 MANAGEMENT RECOMMENDATIONS

Food, water, and cover are basic wildlife attractants. Management of these resources at KTVL can minimize wildlife attraction to the airfield. The WHA provides background information describing the types of wildlife that are typically attracted to various areas on and around an airport. The categories discussed in this section describe the basic areas for wildlife management. Although some airports immediately employ lethal control management practices on wildlife, particularly on airport property, depredation should be used only after applying non-lethal management techniques. The FAA recommends a basic hierarchy of wildlife management techniques before resorting to depredation (Figure 46).

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FIGURE 46. HIERARCHY OF WILDLIFE MANAGEMENT TECHNIQUES

6.1 Habitat Modification

Habitat modification generally refers to evaluating and potentially modifying any existing wildlife attractant areas that currently exist on an airport. Fencing is the most frequently used modification followed by vegetation and turf management.

6.1.1 AOA Vegetation

The airport has heavy coniferous tree cover, and seedling and sapling trees are encroaching onto the AOA and RSA. Several shrub species are encroaching in the grass areas. Trees and shrubs should be removed following FAA guidelines.

6.1.2 Grass/Turf Management

KTVL lies in a lower montane elevation valley where turf grasses are not grown generally. Instead, bunch grasses, both native and non-native erosion-control grasses, are used as the ground cover on the AOA and there is no landscaped turf at the Airport. Bunch grasses reach their maximum annual height as inflorescence development starts and maintain that height through seed set and seed dispersal. Common grasses within the AOA included various wheatgrasses, fescues, and bromes. The mixed bunch grass and wildflowers attracted birds and raptors that use grassland habitat. Icterids, corvids, doves, larks, and sparrows are particularly attracted to short grass for foraging and loafing.

Guidance on mowing heights for airfield areas is in the FAA and US Department of Agriculture (USDA) document entitled, "Wildlife Hazard Management at Airports: A Manual for Airport Personnel (2005)." The FAA recommends maintaining grass heights between 6 to 12 inches; however, grass areas in the AOA may occasionally be lower or higher than the guidance heights due to wet and/or dry season weather patterns that may preclude mowing during certain times of the year.

Un-mowed grass provides cover for rodents, reptiles and larger mammals, and serves as a raptor hunting attractant area. When airports are unable to conduct mowing operations due to variability in seasonal growth conditions, taller grasses are generally considered preferable to shorter grasses. Taller grasses (greater than 12") and sagebrush/other shrubs were found generally within and outside the Runway Safety Areas (RSA).

Because soil saturation varies on the airport and mowing while the soil is wet could cause rutting, mowing zones may need to be established on the AOA. These zones would be mowed at varying heights to better control wildlife nesting and foraging according to the most prevalent species within each zone.

Grasses were mixed with native wildflowers and invasive weeds, particularly perennial pepperweed and bull thistle. Perennial pepperweed is an invasive plant in the Tahoe Basin and the extensive stands on the AOA should be removed because they are a forage-attractant, producing seeds eaten by passerines and small mammals. Grasses and forbs can be killed by spraying with appropriate herbicide treatments around the fences and in areas where invasive vegetation has established.

Shrubs (sagebrush and willows) and seedling or sapling pine trees should also be removed from the AOA because they are a wildlife habitat. The maintenance staff removed a large area of shrubs in the runway median by hand-digging them and this control method is efficient for the size of the AOA area and preferred to prevent soil erosion. Sagebrush, willows, and other woody-stemmed shrubs should be removed by removing the root ball, not cutting the stems to the ground surface, because the woody stems will re-sprout. Killing the shrubs using a glyphosate or similar herbicide without removing the woody stems will leave wildlife cover and perching sites.

6.2 Exclusion – Fences and Gates

Fences were inspected in the preliminary assessment and periodically during surveys. The entire AOA is fenced and access is controlled through several swing-open and electric opening gates. The Airport fences are highly porous with horizontal and vertical gate gaps greater than four inches, uncontrolled fence gaps across

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drainage areas, and numerous breaches under the fence (Figures 47-54 show representative fence and gate conditions). Several fence breaches occurred under the perimeter fence, and many of these breaches show evidence of coyote ingress. Trees and shrubs are growing through or falling onto and damaging the fences in some areas. These areas can be used as bridges for wildlife to enter the AOA. Areas of the fence are in disrepair, or where the outriggers are not maintained; these also allow wildlife ingress. Vegetation around fence bases should be maintained using best management and control practices to reduce potential habitat for ground nesting and foraging wildlife.

Some of the manual and electric gates have horizontal gaps greater than the recommended maximum of four inches above the paved base surface. These gaps allow small to medium-sized mobile terrestrial wildlife to enter the AOA. Modifications to these gates may require adjustments, or the addition of vertical pipes between the upright closures. Any gates with gaps larger than the recommended widths should be remediated by re-hanging or adjusting the base closing distance.

Drainage culverts are also an opportunity for wildlife ingress and egress to the Airport. Most of the culverts were ungrated or the grates were in poor repair. Each culvert on the Airport perimeter should be inspected and grates should be installed where necessary.

The FAA Deer Fencing Cert Alert 04-16 identifies and recommends the ideal installation of a wildlife fence to exclude large mammals (applicable to coyotes and black bears as well as deer). As routine repair or replacement of fencing is made over time, the Airport should install security/wildlife fencing that deters deer. Fencing maintenance and diligent attention to the eradication of weeds and vines that normally grow and accumulate near fences should help in reducing wildlife intrusions at the Airport. Remediation techniques normally contribute to reductions in wildlife hazards to aircraft at the Airport.

FIGURE 47. CHAIN-LINK AOA FENCE WITH UNMAINTAINED OUTRIGGERS – TREES AND SHRUBS GROWING INTO FENCE

FIGURE 48. CHAIN-LINK FENCE WITH GAP UNDER BURIED FENCING PLACED BELOW MAIN FENCE TO DETER BREACHING

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FIGURE 49. GATE V15 HORIZONTAL AND VERTICAL GAPS AT THE KYBURZ ROAD GATE

FIGURE 50. GAP UNDER THE FENCE CROSSING A DRAINAGE DITCH TO THE UPPER TRUCKEE RIVER

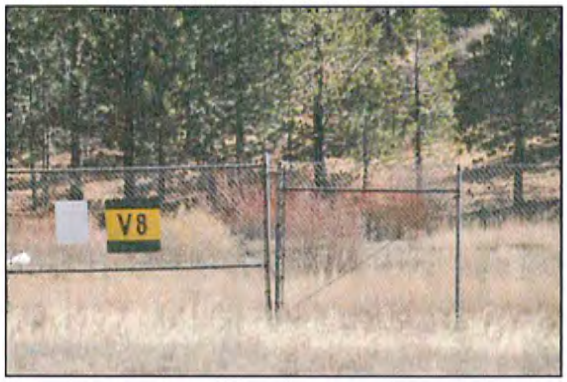

FIGURE 51. GATE V8 VERTICAL GAPS GREATER THAN 4 INCHES IN PERIMETER FENCE AND GATE

FIGURE 52. GATE V10A VERTICAL GAPS GREATER THAN 4 INCHES IN PERIMETER FENCE AND GATE

FIGURE 53. FENCE BASE DEFLECTED WITH LARGE GAP

FIGURE 54. COYOTE TRACKS GOING UNDER THE KYBURZ ROAD GATE

FIGURES 47-54. FENCE AND GATE CONDITIONS

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6.3 Trash Management.

Exclusion also requires developing a secure system to minimize other potential forage attractants on airport property. Dumpster and waste container maintenance is crucial in reducing the numbers of scavenger birds and animals that frequent anywhere that food wastes may be disposed. Food wastes may be disposed at hangars, warehouses, and airport terminals. Dumpsters and waste containers should be placed and secured so they are always inaccessible to wildlife (Figures 55-60).

Restaurant Dumpster. The restaurant uses the dumpster at the front of the Airport Terminal to dispose of food wastes as well as other trash. The lid on this dumpster was rarely closed properly and materials not fitting in the dumpster were stacked next to it. The floor around the dumpster was stained with food residue and waste. In fall 2013, the Airport built a swinging chain-link fence gate to close off the dumpster area, but the gap above the gate and the roof of the building was wide enough to allow bird and animal access. The dumpster was left open and unlocked behind the gate. After a few months of trial, the gate was modified to be a sliding gate, but was rarely closed and the dumpster was not closed and locked (Figures 56-57). The dumpster area should be steam-cleaned and maintained in residue-free condition.

FBO Dumpster. The FBO was vandalized by a black bear sow and two or three cubs because the dumpster and FBO window were left open. The bears came over the perimeter fence by the FBO where the outriggers are parallel to the ground. The dumpster should be locked with a mechanical lock. All trash should be placed in bear proof containers.

Gate A1 Dumpster. This dumpster is placed outside the entry gate and rarely closed.

BBQ Grills. Barbeque grills at the FBO, General Aviation areas, the Terminal, and other locations should be thoroughly cleaned after each use or stored in a bear-proof shed. The grilling odors and food residue are a bear attractant.

Terminal Parking Lot Litter. Some litter that can be wildlife attractants for birds and mammals was scattered occasionally in the Terminal parking lot and around the entry to the Terminal and should be prevented.

Special Events. Litter should be removed at the close of any special events, such as Lake in the Sky Air Show. Leaving litter overnight creates a wildlife attractant.

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FIGURE 55. BEAR SCAT IN THE TERMINAL PARKING LOT

FIGURE 56. FBO DUMPSTER MAINTAINED CLOSED

FIGURE 57. RESTAURANT DUMPSTER –UNMANAGED GARBAGE, GATE LEFT OPEN IN DAYTIME

FIGURE 58. RESTAURANT DUMPSTER – UNMANAGED GARBAGE, WIDE GAP AT TOP OF FENCE

FIGURE 59. A1 DUMPSTER – NOT CLOSED

FIGURE 60. A1 DUMPSTER – OVERFILLED, NOT CLOSED

FIGURES 55-60. DUMPSTER MAINTENANCE FOR WILDLIFE CONTROL

6.4 Exclusion – Pesticide/Herbicide Management

Passerines are attracted to forage on the grass and wildflower seeds produced by the plants on the AOA, and they are attracted to the terrestrial insects that live on those grasses, and the invertebrates (worms, larval

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grubs) that live in the soil. Proper control of insects and weeds in range areas is essential in reducing bird attraction to grassland areas on the AOA. Proper herbicide treatment or mechanical removal of vegetation along AOA fences will help maintenance and operations staff in identifying ingress locations of mobile terrestrial wildlife that provide a prey base for other wildlife species. After the existing breaches are repaired, herbicide treatments along the fence lines will allow for identification of breaches and targeted repairs to reduce the numbers of wildlife using these areas (Figure 61).

FIGURE 61. FENCE BASE WITH OVERGROWN VEGETATION AT THE BASE

6.5 Exclusion – Storm water Drainage and Wetland Features

Most wildlife requires water resources for survival, and is attracted to flowing water or wetland areas. At KTVL, storm water is collected into the storm water pond on the south side of the hangars, then flows into the ditch on the west side of the taxiway (Figures 62-65). The storm water pond was heavily vegetated with cattails and willows and attracted nesting red-winged blackbirds. To limit nesting in the near-term, the emergent vegetation should be removed and the pond should be modified to drain per FAA guidance.

FAA describes specific conditions in which retention ponds may exist around the Airport. Dry retention areas must be able to fully drain within 48 hours following a rainfall event. These restrictions are described in AC 150/5200-33B.

In addition to federal regulations pertaining to wetlands, wetlands in the Upper Truckee River floodplain are regulated by the Tahoe Regional Planning Agency guidelines and specific planning and permitting requirements related to Stream Environment Zones guide alterations to these sites. Portions of historic flow-ways and the drainage ditch on the Airport may be regulated by SEZ guidelines.

The ditch drains north into the Upper Truckee River at the north end of the Airport, where it discharges to the river. Waterfowl, muskrats, foraging birds (swallows, nighthawks), and bats were attracted to the drainage ditch. Accumulated sediment and emergent cattails and willows impeded drainage from the ditch. Drainage should be improved by removing the shrubs and emergent vegetation from the ditch or the ditch should be placed underground.

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The ditch culverts at the perimeter of the AOA are terrestrial wildlife ingress and egress points. While grating the ditch culverts will not control waterfowl or other bird access, the culverts should be grated to preclude terrestrial wildlife from entering the AOA.

Drainage on the east side of the AOA is poor as this area has remnant river oxbows and develops temporary emergent wetlands that accumulate precipitation and snowmelt. The temporary wetlands attract medium to large-sized shorebirds and waterfowl, such as killdeer, mallards, and Canada geese. In the swallow guild, a small group of barn swallows nested at the Airport and were observed foraging over the airport drainage ditch and river floodplain on the east side of the Airport. Swallows are water-dependent and, when large numbers are present, often converge in large flocks that fly erratic patterns; however, the few swallows that nested at the Airport did not form large, wheeling flocks.

FIGURE 62. MALLARDS LOAFING IN THE DRAINAGE DITCH LOOKING SOUTH ON THE AOA

FIGURE 63. MALLARDS LOAFING IN THE DRAINAGE DITCH BY OBSERVATION POINT OP6

FIGURE 64. DRAINAGE DITCH VEGETATED WITH CATTAILS AND WILLOWS, LOOKING NORTH ON THE AOA

FIGURE 65. CULVERT WITH UNSECURED WIRE MESH GRATE DRAINING TO FLOODPLAIN

FIGURES 62-65. STORM WATER POND, DRAINAGE DITCH, AND CULVERT ASSESSMENT

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6.6 Harassment

Successful harassment procedures require persistence and regularity, and include the use of a variety of wildlife behavior based techniques. When wildlife experience consistent harassment, they usually will leave the AOA as the continued harassment causes them to exert too much energy for the forage benefit they could possibly gain. Lights, horns, and pyrotechnics are generally useful harassment practices.

Pyrotechnics are the most effective technique used for hazing and harassment. The most effective pyrotechnics include the use of 15 mm launchers with screamers and bangers used sequentially and persistently until the wildlife leave the area. Though screamers and bangers are very cost-effective, there are several other pyrotechnics that can also prove successful in keeping wildlife away from active areas on the Airport. Other devices may include mobile Propane Air Cannons that can be remotely fired to keep wildlife away. The use of these devices requires specific training for safe handling and storage. Appendix C lists sources of supply for these devices.

Canada geese are attracted to green grass along the runway and taxiways in the spring, and pyrotechnics harassment by Airport operations is necessary to cause them to leave the AOA temporarily. Brewer's blackbirds congregating in a large group in the cattails in the drainage ditches by the hangars were harassed using screamers early in the morning of the Lake in the Sky Air Show and dispersed to the river floodplain; they stayed off the AOA for the duration of the Air Show.

Birds are often attracted to freshly mowed grasses. Mowing tends to activate insect movement and consequently excites bird foraging in those areas. Should standard harassment techniques fail to keep the birds from foraging behind mowers, the next most commonly used tactic is depredation. Depredation should only be used after all other non-lethal techniques have been employed, and only if the activity is problematic to the safe operation to aircraft using the airport.

6.7 Capture and Relocation

Capture through the use of snares, traps, and manual collection and relocation away from the airport is another method for management of wildlife on an airport. Generally, relocation of wildlife is not supported by technical assessments conducted by The Wildlife Society; however, bears and coyotes are sometimes captured and relocated using snares or live traps. Relocation of habituated bears is a default solution instead of teaching the public how to coexist with bears. Improving garbage management and fixing the fence will reduce incursions by these two species at KTVL.

Relocation of some species is difficult and may not be allowed by regulatory agencies. The Airport should consult with the local wildlife authorities before attempting any offsite relocations. Non-regulated predator species are generally depredated, as it is typically difficult to find acceptable relocation sites.

6.8 Lethal/Depredation

Lethal or depredation practices are usually considered as a last resort for most native wildlife species. Lethal control or depredation of problem and invasive species is usually permitted by local wildlife agencies.

The Airport staff has not used lethal control to date. Permits are not typically required for depredation of coyotes. The coyote populations inside the AOA are likely to be reduced significantly as a result of the corrective gates adjustment and the installation of breach blocks along fences where gaps exceed four inches in height or width. State sanctioned policies normally allow and encourage depredation to control coyotes at airports.

Currently, the Airport does not hold state and federal depredation permits to control hazardous wildlife on the AOA. The Airport should obtain and annually renew a Migratory Bird Treaty Act (MBTA) Depredation Permit from the USFWS and other permits as necessary. Management actions such as migratory bird nest removal and egg oiling activities may only be allowed under special permit conditions of the MTBA. KTVL should keep

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an active depredation permit at all times to avoid delays if a "take" action is necessary for migratory birds. Lethal removal of migratory birds should only be used as a last resort to reinforce other non-lethal techniques.

House sparrows, rock pigeons, and European starlings often nest in structure around airports. These species are not covered under the MBTA, therefore their nests can be removed and individual can be taken without a Depredation Permit. The Depredation Permit should be specific as to the problem species that may need to be controlled by lethal methods. Some of these species may include: geese and other waterfowl, gulls, crows/ravens, swallows, and blackbirds.

6.9 Communications

Wildlife strike reports should be generated voluntarily and communicated to the Airport operations using FAA form 150/5200-7. Periodic staff interviews are part of the overall communications program for wildlife hazard management. The ATCT is closed and was not visited throughout the assessment period. In the absence of an ATCT, the Airport Operations staff and FBO representative should regularly alerted pilots when wildlife are observed or located in potentially hazardous areas with respect to approaching or departing aircraft. FAA Order 7110.65 describes specific requirements for advisories through regularly updated pilot reports (PIREPS), and notices to airmen (NOTAMS). These above-required advisories should be regularly updated and appropriate alerts should be communicated as necessary. A limited field-of-view exists because of the obscured low elevation valley below the approach end of RW-36, and the distance limitations for observing most wildlife at the approach end of RW-18 that is over 1/2 mile north of the FBO and obscured by trees.

Communication with tenants is important. Hangars are routinely kept closed but some of the overhead doors were open occasionally during daytime activities. Several hangars were inspected from the inside in search of wildlife that may nest or frequent the rafters and/or roof corners (Figures 66 and 67). Overall, hangar maintenance was found to be very good.

FIGURE 66. HANGARS WERE WELL MAINTAINED

FIGURE 67. HANGAR INTERIOR

FIGURES 66-67. HANGAR CONDITIONS

Barn swallows and Steller's jays nested in the Terminal tunnel. After the birds initiated nesting they became focused on the tunnel and waited outside until the door opened to return to their nests (Figure 68). To deter nesting the tunnel door should be closed whenever possible although, since the birds have become focused on the tunnel, staff will need to watch constantly and remove any nest material as it accumulates before a nest is formed, or allow the few pairs of birds to nest if a nest of a regulated species is established.

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FIGURE 68-SWALLOW NEST IN THE TERMINAL TUNNEL

7 LIMITATIONS

Lake Tahoe Airport does not have a permit for "depredation by firearms". The Airport should apply for and obtain depredation permits approved by state and federal regulatory agencies for use by Airport Operations staff. The staff should use depredation when necessary to manage persistent species (primarily Canada geese) that may not leave the AOA if harassed by non-lethal harassment techniques.

After the airfield is secured through perimeter fence replacement, gate adjustment, and tree removal, the presence of coyotes should be re-assessed. Coyotes are comfortable on the Airport, and to an extent they are beneficial to control prey-base wildlife including pocket gophers and other small mammals. If necessary, the Airport should contract with a wildlife trapper licensed to trap coyotes, or train airport staff on methods to safely remove them.

PRIORITIZED RECOMMENDATIONS AND CONCLUSIONS

This section summarizes the recommendations and conclusions of the WHA and establishes priorities for implementation.

7.1 Administrative/Operational Actions

The administrative and operational actions include the following:

7.1.1 Wildlife Coordinator

Identify a Wildlife Coordinator. A Wildlife Coordinator for KTVL should be designated. The Wildlife Coordinator is responsible for managing wildlife management activities and assuring that the recommendations of the WHA are implemented, as appropriate. The Wildlife Coordinator is responsible for the following activities.

- Conducting or coordinating all wildlife management activities.
- Maintaining personal training standards and commitment to the wildlife hazard management activities.

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- Ensuring that all individuals responsible for wildlife hazard management are properly trained.
- Ensuring that all KTVL personnel, pilots, and lessees are familiar with the requirements and procedure for reporting wildlife strikes.
- Ensuring that all KTVL staff with access to the AOA routinely inspect the AOA for wildlife hazards and report all identified wildlife hazards to the Wildlife Coordinator.
- Obtaining appropriate wildlife control permits and supplies, as necessary.
- Continued wildlife monitoring.
- Recording wildlife management activities. Use of a Wildlife Management Database is highly recommended.

7.1.2 Inform All KTVL Users of Potential Hazards

To reduce the potential for a strike, KTVL should implement procedures for communication between the FBO and pilots, in accordance with FAA Order 7110.65. Because there is no ATCT, if Operations, the Fixed-Base Operator (FBO), or CALSTAR see a potential wildlife hazard, such as a large flock of birds or large birds entering into the approach, departure, and circling airspace, they should communicate the situation to pilots and alter operations if necessary to avoid potential strikes. To facilitate wildlife hazard communications, KTVL and the FBO should develop a Bird Watch Condition protocol that categorizes bird activity into low, moderate, and severe conditions. Bird Watch Condition codes can be posted in the pilots' lounge to increase awareness and promote reporting of hazards among aircrews. The categories should be determined based on the risk of bird strike and can be described as follows:

- LOW – Normal bird activity on and above the airfield with a low probability of a strike.
- MODERATE – Increased bird activity in locations that heighten the potential for strikes. This condition should alert operations staff to consider hazing the problem wildlife. This condition would require heightened awareness by all KTVL staff and aircrews.
- SEVERE – High bird activity on or immediately above the active runway or other specific location that represents a high potential for strike. Examples of this would be groups of Canada geese or Brewer's blackbirds or other species foraging on, adjacent to, or over the runways. Supervisors and aircrews must thoroughly consider rescheduling flights until the bird watch condition is decreased.

All KTVL operations and maintenance personnel should be trained to identify the birds, watch conditions, and effectively communicate these conditions between pilots and Fixed-Base Operators (FBOs). The training is usually performed by an FAA qualified airport wildlife biologist trainer at the conclusion of the FAA and Airport staff approval of the WHMP. Pilots should be encouraged to submit a PIREP if large flocks of birds or other wildlife hazards have been observed during their approach or departure from KTVL. The PIREP will advise other pilots of potential wildlife hazards in the area.

Avian movements in the AOA were most abundant in the early and mid-morning hours. Activity levels tend to diminish later in midday, and decline in the early evening hours. Most of these movements are associated with groups of western meadowlarks, mountain bluebirds, common ravens, and horned larks flying across the AOA to access foraging sites. Raptors/vultures (primarily red-tailed hawks) and corvids (common ravens and Steller's jays) were also common during this period, and all actions should be in place to alert pilots of wildlife activities. Similar precautions should be enacted when waterfowl of any species are observed. The NOTAM system should be used for wildlife warnings. Since pilots are often de-sensitized to common or repeated warnings on the NOTAM system, NOTAM warnings should be regularly updated. When actual hazards are observed, reported by pilots or operations staff, especially beginning at sunrise and continuing for approximately two hours, a NOTAM could be posted indicating the specific avian activity observed in the AOA. Continuous or generic advisories are not advised. General aviation pilots, the FBO, and business traffic may

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have flexibility in scheduling flights to avoid known periods of high bird activity and concentrations. Information regarding historical trends in bird activity should be made available to all airport users so they consider possible wildlife activity when scheduling flights.

7.1.3 Community Outreach and Wildlife Hazard Working Group

Periodic inspections with formalized record-keeping will be very important in observing wildlife activities around the Airport, and will continue to be necessary to improve on the management techniques used to control wildlife. Coordination among the Lake Tahoe Airport Administration should be enhanced.

KTVL FBO and several lessees operate hangars and use the airfield. The Airport, restaurant, Mountain West Aviation, CALSTAR, and private hangar lessees maintain dumpsters in and adjacent to the KTVL AOA. KTVL can reduce the potential for these dumpsters to become attractants by developing a tenant and community outreach program to ensure users' and neighbors' support in reducing wildlife attraction. KTVL lessees and the FBO should participate in identifying and reporting potential hazards or strikes as they observe them. The Wildlife Coordinator should develop a Wildlife Hazard Working Group (WHWG) that focuses on public outreach and wildlife management on the airfield. The Wildlife Hazard Working Group would implement the following steps in this outreach program.

- Coordinate with all airfield lessees to eliminate leaving any foods wastes available for wildlife on the Airport property.
- Use written letters, signs, and other communication methods (mailings, radio announcements, web-based messaging) to inform neighboring residents and business owners about the need to minimize wildlife use around the Airport. The information materials should stress the need to cover all dumpsters and avoid feeding wildlife. The City could emulate the Town of Mammoth Lakes program for co-existing with bears.
- Contact local resources agencies, the City of South Lake Tahoe, El Dorado County, and neighboring communities to discuss controlling wildlife attractants.

7.1.4 Maintain Appropriate Permits to Control Wildlife

KTVL should obtain and annually renew a Migratory Bird Treaty Act (MBTA) Depredation Permit from the USFWS. KTVL may need to implement lethal removal of MBTA-protected birds such as Canada geese, mallards, hawks, and other species. KTVL will need a MBTA Depredation Permit to implement these management actions. KTVL should keep an active depredation permit at all times so that delays can be avoided if take of a migratory bird is necessary.

Lethal removal of these species should only be used as a last resort to reinforce other non-lethal techniques. The KTVL surroundings support healthy bird populations; therefore, lethal removal would likely result in only a temporary reduction of birds in the AOA. Lethal removal should be supplemental to other management techniques and implemented in particularly problematic situations. Problematic situations that may warrant lethal removal include an immediate threat to life or property, excessively territorial raptors diving on aircraft, or groups of birds nesting on structures.

House sparrows, rock pigeons, European starlings, and Eurasian collared doves often nest in structures. These species are not covered under the MBTA, therefore, their nests can be removed and individuals taken without a Depredation Permit.

7.1.5 Train Personnel in Wildlife Identification and Hazing Techniques

All personnel who have access to the AOA should be trained to recognize and respond to potential wildlife hazards. Personnel on the AOA will need to make rapid decisions about the appropriate actions to address a potential wildlife hazard immediately after the hazard is identified. Good decisions cannot be made without adequate training. Personnel need to know when a potential hazard warrants hazing the problem individuals or just notifying the Wildlife Coordinator. If hazing is necessary (e.g., common ravens or horned larks foraging

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on the runway), personnel must know not to haze the wildlife when aircraft are on approach, landing roll, or takeoff.

Personnel should be trained to identify hazardous wildlife and hazardous threat conditions as per FAA requirements detailed in AC 150/5200-36A. Readily available field guides should be made available to personnel to facilitate species identification. The Wildlife Coordinator should assemble a flow chart that identifies the appropriate actions to take when certain conditions or wildlife occurs. In addition, personnel should be trained in the safe handling and use of hazing devices. Wildlife Services and consultants offer training courses and periodic training updates to familiarize airport staff on wildlife identification, and the most current dispersal technology and safety procedures.

7.1.6 Improve Wildlife Strike Reporting

KTVL personnel who conduct runway and airfield inspections should be informed of the importance of collecting and reporting wildlife remains. All wildlife remains found within the AOA should be identified to the species level, and the observation must be reported to the Wildlife Coordinator for inclusion in the strike log. FAA AC 150/5200-32B clearly states that a wildlife strike has occurred if "Bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified."

Proper identification of the species will allow the Wildlife Coordinator to adapt management actions as necessary. If KTVL staff or a local biologist is not able to identify remains to the species level, the Wildlife Coordinator can send portions of the remains to the Feather Laboratory at the Smithsonian Institute for identification. KTVL staff would need to complete FAA Form 5200-7 and mail the form and remains to the feather identification lab. FAA AC 150/5200-32B contains detailed instructions on processing and submitting wildlife remains.

This is a free service funded at the national level by the FAA. Feather and DNA remains can be sent to:

Feather Laboratory
Smithsonian Institute
NHB, E610, MRC 116
10th & Constitution Avenue NW
Washington DC 20560-0116

7.1.7 Continue Wildlife Monitoring

The Wildlife Coordinator or a contractor should continue to monitor wildlife activity at KTVL on a regular basis. This WHA provides a baseline for wildlife occurrences and uses in and around KTVL; however, wildlife uses and movements in the area will change as environmental conditions change. KTVL should track the changes in wildlife movements in order to adapt management techniques. This would require conducting regular surveys of the airfield and surrounding areas of influence. The survey methodology should be similar to the methods used for this WHA. Surveys should be conducted at least once during each season of the year. The survey data should be managed in a database that is accessible to the Wildlife Coordinator. The Wildlife Coordinator should review the data regularly to identify changes in the wildlife uses and adapt management actions as necessary.

7.1.8 Runway and Airfield Inspections

Routine runway inspections are an excellent opportunity to identify potential wildlife attractants in the movement areas. During runway inspections, KTVL staff should be looking for any items that may attract opportunistic feeders such as common ravens. Opportunistic eaters can be attracted to carcasses, cyclical insect infestations, wildlife scat, discarded food products, wrappers, and even small, colored objects. When identified, these items should be removed from the movement areas.

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7.1.9 Hangar Maintenance

Few problems were observed with birds entering the hangars to roost. Birds typically start looking for protected places to roost just before sunset. One way to discourage roosting in hangars is to close the hangar doors one hour before sunset. By closing the hangar doors the option is removed for birds to access and roost in the hangar. Typically, birds have located their night roost within one hour after nightfall. If desired, the hangar doors can be opened one hour after nightfall with little potential for birds to enter. Another option for deterring roosting is to install netting on the hangar ceiling. Installing netting can be very expensive and it must be done properly to be effective. Netting must cover all corners, beams, pipes, tracks, and infrastructure to be effective. Effigies have been used also but are generally ineffective and they may not deter birds that are intent of roosting inside the hangars.

Scavenger birds and bears can get into dumpsters and pull out discarded food, which may then blow around the airfield. All dumpsters located on the AOA that receive discarded food products should be replaced with dumpsters that have functional latching mechanisms on the lids. If replacing the dumpsters is not feasible, the existing dumpsters should be retrofitted to include a functional latching mechanism on the lids.

Dumpster placement is also critical. Lids must be able to be closed after they are emptied. Stenciled lettering on the outside face of the dumpster can be easily painted to state "Dumpster Lids Must Be Closed At All Times".

7.1.10 Habitat or Facilities Modifications

Habitat and facilities modifications are effective techniques for reducing wildlife attraction to airfields. At KTVL, habitat and facility modifications should include implementing an infield management program, landscape management, repairing the perimeter fence, and removing unnecessary perches. These recommendations are discussed below.

7.1.11 Infield Management

The FAA (CertAlert 98-05) generally recommends maintaining the grass height at 6 to 12 inches throughout the Airport property; however, KTVL is at a lower montane elevation where the ground vegetation is dominated by sparse bunch grasses and clumps of flowering forbs growing typically at a density of 40-60% cover. Vegetation within the AOA should be the same height because birds are attracted to shorter grass (less than 6 inches) for foraging and un-mowed grasses (greater than 12 inches) have increased small mammal populations during different seasons (Barras et al. 2000). The current mowing regime at KTVL maintains grass height in the RSA at approximately 6-18 inches in the Object Free Areas and greater than 15 inches in most of the outer airfield. Based on communications with maintenance staff and observation, KTVL mows the airfield only as needed and dependent on actual conditions. This mowing regime is partially satisfactory in managing the ground nesting birds or small mammal populations within the AOA. Ground foraging birds seek shelter in the tall grasses and sagebrush. Small numbers of horned larks, columbids, sparrows, starlings, western meadowlarks, corvids, passerines, and blackbirds were observed foraging in the bunch grasses. Bushes (willows and others) and seedlings, saplings, and small pine trees around the AOA fence and within the infield areas should also be removed to eliminate perching and nesting habitat.

Scattered areas of sagebrush habitat provide cover for small mammals such as mice, rabbits and ground squirrels, which then attract predators – primarily coyotes and red-tailed hawks. The removal or mitigation of these areas should help in reducing the prey base and the populations of raptors and ravens that frequent the AOA.

7.1.12 Landscape Management

Sparse landscape plants and bunch grasses are located at the Terminal parking areas and along the Airport entrance road. These areas did not appear to attract aggregations of wildlife.

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7.1.13 Perimeter Fence Inspection/Repair

Coyotes currently use breaches in the perimeter fence to access the airfield. The perimeter fence should be modified to employ an animal-proof perimeter fence as referenced in AC 150/5370-10F and/or FAA CertAlert 04-16 as funding becomes available or as sections of the fence are repaired or replaced. Sapling and mature trees and shrub vegetation should not be allowed to grow or accumulate on the fence line.

The fence line should be patrolled at least daily, and any washouts, breaks or other holes in the fence should be repaired as soon as they are discovered. The outriggers in some portions of the existing fence are improperly installed. Fence modifications should include ensuring that all outriggers are angled outward to prevent animals from jumping over the fence. Areas of outriggers are presently installed horizontally to the ground, and a black bear cub was photographed coming over the fence and walking on the horizontal outrigger. The fence is has many breaches such that coyotes have innumerable access points and their access to the AOA will not be controlled until the fence is repaired. If necessary, a concrete or asphalt threshold (or speed bump) could be installed under each gate to minimize gaps under the gates. If installing a concrete threshold at each gate is cost prohibitive, KTVL should consider installing gate-brooms. Gate brooms attach to the bottom of the gate, look like broom bristles, and give the gate a solid appearance to the ground.

In areas where a fence segment terminates at the corner of a structure, KTVL should ensure that the gap between the structure and the fence does not exceed 4 inches. If the gap exceeds 2 inches, the fence should be extended to close the gap. In addition to the fence modifications, KTVL staff should conduct daily visual inspections of the entire perimeter fence. The inspections should focus on identifying and repairing new breaches in the fence and ensuring that all the gates along the perimeter fence are free of gaps.

7.1.14 Avian Perch Modifications

Birds routinely perch on structures for hunting and resting. Common perches at KTVL include fences, runway markers, and power poles. Western meadowlarks, mountain bluebirds, red-winged and Brewer's blackbirds, starlings, raptors, and ravens were commonly observed perching on these structures. Most of these structures are essential for the operation of the airfield. KTVL should consider removing any unnecessary structures to minimize the number of available perches in the AOA.

As mentioned above, runway markers and other structures necessary for airport operations are also used as perches. Specifically, aerial insectivores were commonly observed perching on the runway markers while foraging for insects. Bird barrier spike strips should be installed on the runway markers to deter perching birds. In addition to structures, tall vegetation provides excellent perching opportunities and should be eliminated.

7.2 Wildlife Control

This section outlines the various types of wildlife control and their respective applications.

7.2.1 Harassment and Deterrence Hazing

Bird species from different guilds use the airfield for nesting, foraging, roosting, and loafing. The recommended infield management program will help decrease this activity over time but will not be an immediate solution for many species. All KTVL personnel who have access to the airfield should be capable of hazing birds in the AOA, primarily through the use of hand-launched pyrotechnics. Repeated hazing is very important with flocking birds. When one or two individuals land in the airfield, they can attract more individuals of the same species, resulting in a rapid increase in birds in the airfield. To avoid the rapid congregation of birds, birds should be hazed as soon as they land. Hazing will need to be increased during the spring, summer, and fall months when the breeding and migratory bird population in the area increases.

Hazing should also be implemented to deter raptor foraging in the airfield. Raptors were observed foraging in the airfield on numerous occasions. Raptors often soar above the foraging grounds to spot potential prey.

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Soaring raptors pose a threat to KTVL aircraft; therefore, soaring raptors should be hazed to deter this behavior. KTVL has employed coyote decoys to deter birds, and these can be effective if they are moved periodically in a random pattern to simulate coyote movements on the AOA.

7.2.2 Pyrotechnics and Bioacoustics

The use of pyrotechnics or other audible deterrents are recommended. Individuals utilizing pyrotechnics on the airfield should maintain open and continuous communications with the KTVL ARFF Department. Pyrotechnic users must communicate on the Unicom channel to avoid dispersing birds when aircraft are on approach or takeoff. ARFF fire department may need to be on alert during pyrotechnic use due to the area's high fire hazard potential. Bioacoustic devices use the recorded distress or alarm calls of the species to be dispersed projected over any suitable speaker system and may be used in conjunction with a diversity of pyrotechnics for best results.

KTVL presently uses handheld pyrotechnics for hazing birds. Considering the species utilizing the airfield, the use of bangers and/or screamers is recommended. The Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATF) regulates the use of explosive pest control devices (EPCDs). The Bureau of Alcohol, Tobacco, and Firearms (ATF) recently clarified to the FAA that the distribution to, receipt of, and use of explosives by municipal airports, or their explosives contractors and subcontractors, are exempt from explosives licensing requirements. Since KTVL is a local government-owned agency, the Airport would not be required to obtain licensing from the BATF to purchase and use EPCDs.

7.2.3 Bureau of Alcohol, Tobacco, Firearms, and Explosives Permitting

Information on obtaining a permit can be found at www.atf.gov/explosives/how-to/become-an-fel.html. Obtaining a permit would require KTVL to complete BATF Form 5400.13, pay a fee, and submit personal identification information for identified responsible persons and Employee Possessors. Permitted EPCD users must store the EPCDs in BATF-approved storage devices. Depending on the EPCD being stored, either Type 1, Type 2, or Type 4 storage magazines are required for storing EPCDs. In addition, EPCD users are required to maintain and submit reports that detail the daily uses and storage procedures being employed. Appendix B includes a summary sheet that describes the specific requirements for obtaining and using EPCDs. All parties involved with the use of pyrotechnics on an airfield should attend annual safety training. Annual training should be included in the FAA required wildlife hazard training course, as described in AC 15/5200-36A and should include safe handling, storage, and use of EPCDs.

8 REGULATORY IMPLICATIONS

This section evaluates the regulatory implications of the recommended management actions. These discussions provide brief overviews of the various federal, state, and local regulations that most airports must consider when implementing projects.

8.1 Federal Endangered Species Act

Section 9 of the Endangered Species Act (ESA) prohibits the "take" of any federally listed endangered species (16 United States Code [USC] 1538(a)). The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532(19)). If it is not possible to design an otherwise lawful land use activity in a manner that avoids take of a listed species, either directly or through habitat modification. Section 10(a)(1)(B) of the ESA (16 USC 1539(a)(1)(B)) authorizes the USFWS to issue a permit allowing take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Although no federally-listed species were considered problematic at KTVL, the Airport Wildlife Coordinator must periodically check the list published by the USFWS to learn if any species might be impacted by wildlife

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management actions. Federally-listed threatened and endangered species in El Dorado County include plants, invertebrates, fish, amphibians and reptiles, and birds (Table 7).

Table 7.U S Fish & Wildlife Service - Threatened and Endangered Species – El Dorado County

Group	Name	Population	Status	Lead Office	Recovery Plan Name
Amphibians	California tiger Salamander (Sonoma) (*Ambystoma californiense*)	U.S.A. (CA - Sonoma County)	Endangered	Sacramento Fish And Wildlife Office	
Amphibians	California red-legged frog (*Rana draytonii*)	Entire	Threatened	Sacramento Fish And Wildlife Office	Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*)
Birds	Greater sage-grouse (*Centrocercus urophasianus*)	entire	Candidate	Wyoming Ecological Services Field Office	
Conifers and Cycads	Whitebark pine (*Pinus albicaulis*)		Candidate	Wyoming Ecological Services Field Office	
Crustaceans	Conservancy fairy shrimp (*Branchinecta conservatio*)	Entire	Endangered	Sacramento Fish And Wildlife Office	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Crustaceans	Vernal pool fairy shrimp (*Branchinecta lynchi*)	Entire	Threatened	Sacramento Fish And Wildlife Office	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Crustaceans	Vernal pool tadpole shrimp (*Lepidurus packardi*)	Entire	Endangered	Sacramento Fish And Wildlife Office	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Fishes	Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*)	Entire	Threatened	Nevada Fish And Wildlife Office	Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*) Recovery Plan
Flowering Plants	Stebbins' morning-glory (*Calystegia stebbinsii*)		Endangered	Sacramento Fish And Wildlife Office	Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills
Flowering Plants	Pine Hill ceanothus (*Ceanothus roderickii*)		Endangered	Sacramento Fish And Wildlife Office	Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills
Flowering Plants	Pine Hill flannelbush (*Fremontodendron californicum ssp. decumbens*)		Endangered	Sacramento Fish And Wildlife Office	Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills
Flowering Plants	El Dorado bedstraw (*Galium californicum ssp. sierrae*)		Endangered	Sacramento Fish And Wildlife Office	Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills
Flowering Plants	Tahoe yellow cress (*Rorippa subumbellata*)		Candidate	Nevada Fish And Wildlife Office	
Flowering Plants	Layne's butterweed (*Senecio layneae*)		Threatened	Sacramento Fish And Wildlife Office	Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills
Flowering Plants	Sacramento Orcutt grass (*Orcuttia viscida*)		Endangered	Sacramento Fish And Wildlife Office	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Insects	Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	Entire	Threatened	Sacramento Fish And Wildlife Office	Valley Elderberry Longhorn Beetle Recovery Plan
Reptiles	Garter Snake (*Thamnophis gigas*)	Entire	Threatened	Sacramento Fish And Wildlife Office	Draft Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*)

8.2 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 USC 668) prohibits taking, possession, and commerce of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) or any part, nest,

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or eggs without a permit issued by the Secretary of the Interior. "Take" is defined as to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. "Disturb" is defined in 50 CFR 22.3 as the act of agitating or bothering a bald or golden eagle to a degree that, based on the best scientific information available, causes, or is likely to cause one or more of the following conditions: 1) injury to an eagle; 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or shelter behavior.

Furthermore, "disturb" also includes the impacts of human-induced alterations occurring near a nest site during a time when eagles are absent from the area if, when the eagle returns, those alterations would agitate or bother an eagle to the extent that it interferes with or interrupts normal breeding, feeding, or sheltering habits, and cause injury, death, or nest abandonment.

In limited situations, the USFWS does have a mechanism available to authorize take of bald and golden eagles pursuant to the BGEPA (*Federal Register* 74:46836). On November 10, 2009, the USFWS authorized limited take of bald and golden eagles under the BGEPA (*Federal Register* 74:46836). Rule 50 CFR 22.26 authorizes the issuance of permits to take bald and golden eagles where take is incidental to otherwise lawful activities. Permit provisions under 50 CFR 22.27 allow for intentional take of eagle nests under particular, limited circumstances. The WHA biologists observed golden eagles on and/or near KTVL during the assessment period and bald eagles have been reported in the area. Recommended coordination with the USFWS and management actions will be necessary prior to any anticipated take or harassment actions of either of these species. No lethal take of these species is anticipated to be necessary, but the Airport should pursue a permit to haze these species whenever they pose hazards to aviation.

8.3 Migratory Bird Treaty Act

The MBTA of 1918 (16 USC 703–712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the USFWS. Even though the MBTA does not have provisions for allowing unauthorized take, the MBTA recognizes that some migratory birds may be killed by aircraft despite implementing measures to avoid "take" of birds.

Acknowledging that large populations of certain bird species can cause damage to aircraft and threaten human safety, the USFWS by regulation and permit has provided for controlled take of certain species in specific areas at specified times. Before KTVL conducts any management activities that would result in "take" of birds protected by the MBTA, KTVL should obtain an MBTA "take permit" from USFWS. The Airport must also first contact the US Department of Agriculture APHIS Wildlife Services to provide a Form 37 consultation to the USFWS in order for the USFWS to issue depredation permits.

8.4 Section 404 of the Clean Water Act

The U.S. Army Corps of Engineers (USACE) is responsible for the issuance of permits for the placement of dredged or fill material into "waters of the United States" pursuant to Section 404 of the Clean Water Act (CWA) (33 USC 1344). As defined by USACE in 33 CFR 328.3(a)(parts 1–6), "waters of the United States" are defined as:

> *Those waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; tributaries and impoundments to such waters; all interstate waters including interstate wetlands; and territorial seas.*

If a project would result in dredge or fill of "waters of the United States," the project would be subject to Section 404 of the CWA, based on review by the USACE. The KTVL airfield has areas that *may be considered* jurisdictional wetlands or other waters that would be subject to the CWA. Therefore, implementation of the recommended management actions *may require* coordination with or authorization from USACE.

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8.5 Animal Control Act of 1931

Under this act, the U.S. Department of Agriculture (USDA) can manage wildlife injurious to agricultural interests, other wildlife, or human health and safety, including wildlife hazards to aircraft. This act permits USDA to manage wildlife at KTVL, on an as-needed basis, if KTVL retains USDA to perform these services.

8.6 Federal Insecticide, Fungicide, and Rodenticide Act

The U.S. Environmental Protection Agency oversees the registration, labeling, classification, and use of pesticides, as stated in this act. Persons using restricted-use pesticides, applying any pesticides to the land of another, or applying any pesticides for hire, must be a Certified Applicator, or working under the direct supervision of a Certified Applicator, and then may only use pesticides covered by the Certified Applicator's certification. If KTVL, for example, uses a rodenticide to eradicate ground squirrels or a herbicide to manage infield vegetation, then KTVL and their contractor must comply with the Federal Insecticide, Fungicide, and Rodenticide Act. Permits and licenses are issued by the state in compliance with federal requirements.

8.7 National Environmental Protection Agency

A CATEX was required by paragraph 307 of FAA order 1050.1F for the issuance of this planning grant and this WHA will not require additional NEPA documentation; however, some actions that result from future airport modification or wildlife management recommendations might require NEPA analysis. As an example, actions that would require filling in wetlands or impacting wildlife listed in the Endangered Species Act may require NEPA documentation.

8.8 State-Listed Threatened and Endangered Species

FAA Cert Alert 06-07 describes procedures for responding to requests for state wildlife agencies to facilitate and encourage habitat for state-listed threatened and endangered species of species of special concern that occur on airports and may pose a threat to aviation safety. State-listed threatened and endangered species in the California Natural Diversity Database, El Dorado County, South Lake Tahoe Quad, include plants, bryophytes, invertebrates, insects, mollusks, fish, amphibians and reptiles, mammals, and birds (Table 8).

TABLE 8. CALIFORNIA NATURAL DIVERSITY DATABASE - THREATENED AND ENDANGERED SPECIES – SOUTH LAKE TAHOE QUAD

Element Type	Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals - Amphibians	*Lithobates pipiens*	northern leopard frog	None	None	SSC	-
Animals - Amphibians	*Rana sierrae*	Sierra Nevada yellow-legged frog	Endangered	Threatened	SSC	-
Animals - Birds	*Accipiter gentilis*	northern goshawk	None	None	SSC	-
Animals - Birds	*Xanthocephalus xanthocephalus*	yellow-headed blackbird	None	None	SSC	-
Animals - Birds	*Picoides albolarvatus*	White-headed woodpecker	None	None	-	-
Animals - Birds	*Strix occidentalis occidentalis*	California spotted owl	None	None	SSC	-
Animals - Birds	*Empidonax traillii*	willow flycatcher	None	Endangered	-	-
Animals - Crustaceans	*Stygobromus lacicolus*	Lake Tahoe amphipod	None	None	-	-
Animals - Crustaceans	*Stygobromus tahoensis*	Lake Tahoe stygobromid	None	None	-	-
Animals - Fish	*Catostomus platyrhynchus*	mountain sucker	None	None	SSC	-
Animals - Fish	*Oncorhynchus clarkii henshawi*	Lahontan cutthroat trout	Threatened	None	-	-
Animals - Fish	*Prosopium williamsoni*	mountain whitefish	None	None	-	-

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Element Type	Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals - Insects	*Capnia lacustra*	Lake Tahoe benthic stonefly	None	None	-	-
Animals - Mammals	*Lepus americanus tahoensis*	Sierra Nevada snowshoe hare	None	None	SSC	-
Animals - Mammals	*Martes caurina*	Pacific marten	None	None	-	-
Animals - Mammals	*Martes caurina sierrae*	Sierra marten	None	None	-	-
Animals - Mollusks	*Margaritifera falcata*	western pearlshell	None	None	-	-
Animals - Mollusks	*Helisoma newberryi*	Great Basin rams-horn	None	None	-	-
Plants - Bryophytes	*Bruchia bolanderi*	Bolander's bruchia	None	None	-	4.2
Plants - Bryophytes	*Helodium blandowii*	Blandow's bog moss	None	None	-	2B.3
Plants - Bryophytes	*Meesia triquetra*	three-ranked hump moss	None	None	-	4.2
Plants - Bryophytes	*Meesia uliginosa*	broad-nerved hump moss	None	None	-	2B.2
Plants - Vascular	*Arabis rigidissima var. demota*	Galena Creek rockcress	None	None	-	1B.2
Plants - Vascular	*Draba asterophora var. asterophora*	Tahoe draba	None	None	-	1B.2
Plants - Vascular	*Rorippa subumbellata*	Tahoe yellow cress	Candidate	Endangered	-	1B.1
Plants - Vascular	*Epilobium howellii*	subalpine fireweed	None	None	-	4.3
Plants - Vascular	*Botrychium ascendens*	upswept moonwort	None	None	-	2B.3
Plants - Vascular	*Botrychium crenulatum*	scalloped moonwort	None	None	-	2B.2
Plants - Vascular	*Botrychium minganense*	mingan moonwort	None	None	-	2B.2

8.9 Local Ordinances

The South Lake Tahoe City Code is current through Ordinance 1081, passed October 21, 2014. No sections were identified pertaining to listed wildlife or wildlife control permits for activities around the Airport. Feral animal control is managed by El Dorado County Animal Services.

The TRPA Governing Board adopted the current Code of Ordinances effective February 9, 2013.

Water Quality

TRPA implement water quality programs and regulations to attain and maintain federal, state, and local water quality standards under Article V(d) of the Compact. Chapter 60 of the TRPA Code set forth standards for the discharge of runoff water from parcels and regulates the use of pesticides and herbicides. Their use shall be consistent with the Handbook of Best Management Practices. Prior to applying any pesticide, potential users of pesticides shall consider integrated pest management practices, including alternatives to chemical applications, management of forest resources in a manner less conducive to pests, reduced reliance on potentially hazardous chemicals, and additional environmentally sound pest management tactics. Only chemicals registered with the Environmental Protection Agency and the state agency of appropriate jurisdiction shall be used and only for their registered application; alternatives to chemical application shall be employed where practical; and no detectable concentration of any pesticide shall be allowed to enter any stream environment zone, surface water, or ground water unless TRPA finds that application of the pesticide is necessary to attain or maintain the environmental threshold standards.

Vegetation Protection

Chapter 61 of the TRPA Code of Ordinances provides for the protection of Stream Environment Zone (SEZ) vegetation, other common vegetation, uncommon vegetation, and sensitive plants. It also provides for

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remedial management of vegetation to achieve and maintain environmental thresholds for plant species and structural diversity, and the maintenance of vegetation health. The management and protection of vegetation shall, at a minimum, consider the diversity of plant species and landscape pattern of plant communities, and their attributes in relationship to wildlife and fisheries habitat, scenic quality, recreation use, soil conservation, and water quality.

Vegetation Protection

Chapter 62 of the TRPA Code of Ordinances provides for the protecting and enhancement of existing diverse wildlife habitats, with special emphasis on protecting or increasing habitats of special significance, such as deciduous trees, wetlands, meadows, and riparian areas. This chapter applies to any activity or project that could affect basic habitat requirements, such as hiding and thermal cover, food, water, and space as necessary for survival of wildlife populations. Special interest species that are locally important because of rarity or other public interest, and threatened, endangered, or rare species as designated under state and federal endangered species acts shall be protected from habitat disturbance from conflicting land uses. These special interest species are: goshawk, osprey, bald eagle, golden eagle, peregrine, waterfowl, and deer.

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9 ASSESSMENT CONCLUSION

In recent decades, there has been an increase in the number of aircraft wildlife strikes nationwide, which has caused millions of dollars in damage and also poses a serious threat to human safety. Since 1991, KTVL has filed four strike reports, all of which involved bird species. While no recent triggering events have occurred, the same species are present and unabated in the Tahoe Basin as in the 1990s. KTVL practices some conventional measures to mitigate wildlife, including the installation of a wildlife deterrence fence, but general site conditions are not deterring wildlife incursions. Undertaking this WHA is the first step in addressing the wildlife conditions at the Airport. The completion and approval of this WHA will satisfy the requirements of Title 14 CFR Part 139, Section 139.337. Following the review and approval of this document, the FAA will determine the need for a WHMP. The results of the WHA show that safety and operations at KTVL would benefit from the preparation and implementation of a WHMP.

The WHMP should, at a minimum, include provisions for implementing the recommendations outlined in this WHA. These recommendations are designed to reduce wildlife attraction to KTVL and provide a basic structure for managing wildlife at Lake Tahoe Airport. In the interim, the recommendations contained in this WHA can be implemented while waiting for FAA's review of the WHA.

KTVL is commended for initiating this process and addressing many of the recommendations contained in this report through the course of the Wildlife Hazard Assessment. Implementing the recommendations fully will further diminish the potential wildlife hazard potential and ensure that public safety is not compromised.

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12/31/2014 Revised / / 2015

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APPENDIX A

REFERENCES

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APPENDIX B

SUPPLEMENTAL DOCUMENTS

Advisory Circulars and Regulations

FAA Certalerts and Advisory Circulars regarding Wildlife Strikes

Certalert No. 09-10
Wildlife Hazard Assessments in Accordance with Part 139 Requirements

Certalert No.98-05
Grasses Attractive To Hazardous Wildlife

Certalert No. 04-09
Relationship Between FAA And Wildlife Services

Certalert No. 04-16
Deer Hazard to Aircraft and Deer Fencing

Certalert No. 06-07
Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-Listed Threatened and Endangered Species and Species of Special Concern on Airports

AC 150/5200-32B
Reporting Wildlife Aircraft Strikes

AC 150/5200-33B
Hazardous Wildlife Attractants On Or Near Airports

AC 150/5200-34A
Construction or Establishment of Landfills Near Public Airports

AC 150/5200-36A
Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports

Lasers- We have received a lot of questions concerning FAA guidance on the use of lasers on airports to harass hazardous wildlife. There are 2 documents that provide FAA guidance on outdoor laser use around airports.

FAA Advisory Circular 70-1 Outdoor Laser Operations
(12-30-04) provides information for those proponents planning to conduct outdoor laser operations that may affect aircraft operations in the National Airspace System (NAS). Also, the AC explains why notification to the Federal Aviation Administration (FAA) is necessary, how to notify the FAA of the planned laser operation, and what action the FAA will take to respond to such notifications.

FAA Order 7400.2F- Procedures for Handling Airspace Matters
[Effective Date: February 16, 2006 Includes Change 1, Effective August 3, 2006]. Part 6, Chapter 29 prescribes policy, responsibilities, and guidelines for processing a Notice of Proposed Outdoor Laser Operations and determining the potential effect of outdoor laser activities on users of the National Airspace System.

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14 CFR 139.337 - Wildlife Hazard Management.

Code of Federal Regulations - Title 14: Aeronautics and Space

Updated to: January 01, 2011

Title 14: Aeronautics and Space

CHAPTER I: FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION (CONTINUED)

SUBCHAPTER G: AIR CARRIERS AND OPERATORS FOR COMPENSATION OR HIRE: CERTIFICATION AND OPERATIONS

PART 139: CERTIFICATION OF AIRPORTS

Subpart D: Operations

139.337 - Wildlife hazard management.

(a) In accordance with its Airport Certification Manual and the requirements of this section, each certificate holder must take immediate action to alleviate wildlife hazards whenever they are detected.

(b) In a manner authorized by the Administrator, each certificate holder must ensure that a wildlife hazard

assessment is conducted when any of the following events occurs on or near the airport:

(1) An air carrier aircraft experiences multiple wildlife strikes;

(2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph,

substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;

(3) An air carrier aircraft experiences an engine ingestion of wildlife; or

(4) Wildlife of a size, or in numbers, capable of causing an event described in paragraphs (b)(1), (b)(2), or (b)(3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

(c) The wildlife hazard assessment required in paragraph (b) of this section must be conducted by a wildlife

damage management biologist who has professional training and/or experience in wildlife hazard management at airports or an individual working under direct supervision of such an individual. The wildlife hazard assessment must contain at least the following:

(1) An analysis of the events or circumstances that prompted the assessment.

(2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.

(3) Identification and location of features on and near the airport that attract wildlife.

(4) A description of wildlife hazards to air carrier operations.

(5) Recommended actions for reducing identified wildlife hazards to air carrier operations.

(d) The wildlife hazard assessment required under paragraph (b) of this section must be submitted to the

Administrator for approval and determination of the need for a wildlife hazard management plan. In reaching this determination, the Administrator will consider:

(1) The wildlife hazard assessment;

(2) Actions recommended in the wildlife hazard assessment to reduce wildlife hazards;

(3) The aeronautical activity at the airport, including the frequency and size of air carrier aircraft;

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(4) The views of the certificate holder;

(5) The views of the airport users; and

(6) Any other known factors relating to the wildlife hazard of which the Administrator is aware.

(e) When the Administrator determines that a wildlife hazard management plan is needed, the certificate holder must formulate and implement a plan using the wildlife hazard assessment as a basis. The plan must?

(1) Provide measures to alleviate or eliminate wildlife hazards to air carrier operations;

(2) Be submitted to, and approved by, the Administrator prior to implementation; and

(3) As authorized by the Administrator, become a part of the Airport Certification Manual.

(f) The plan must include at least the following:

(1) A list of the individuals having authority and responsibility for implementing each aspect of the plan.

(2) A list prioritizing the following actions identified in the wildlife hazard assessment and target dates for their initiation and completion:

(i) Wildlife population management;

(ii) Habitat modification; and

(iii) Land use changes.

(3) Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits.

(4) Identification of resources that the certificate holder will provide to implement the plan.

(5) Procedures to be followed during air carrier operations that at a minimum includes?

(i) Designation of personnel responsible for implementing the procedures;

(ii) Provisions to conduct physical inspections of the aircraft movement areas and other areas critical to successfully manage known wildlife hazards before air carrier operations begin;

(iii) Wildlife hazard control measures; and

(iv) Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and air traffic using the airport.

(6) Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following an event described in paragraphs (b)(1), (b)(2), and (b)(3) of this section, including:

(i) The plan's effectiveness in dealing with known wildlife hazards on and in the airport's vicinity and

(ii) Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated.

(7) A training program conducted by a qualified wildlife damage management biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the wildlife hazard management plan required by paragraph (d) of this section.

(g) FAA Advisory Circulars contain methods and procedures for wildlife hazard management at airports that are acceptable to the Administrator.

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Federal Environmental Pesticide Control Act of 1972

Federal Environmental Pesticide Control Act of 1972 (7 USC 136-136y, P.L. 92-516, October 21, 1972, 86 Stat. 973) as amended

by: P.L. 93-205, December 28, 1973, 87 Stat. 903; P.L. 94-140, November 28, 1975, 89 Stat. 751; P.L. 95-396, September 30,

1978, 92 Stat. 819; P.L. 98-201, December 2, 1983, 97 Stat. 1379; and P.L. 100-202, December 22, 1987, 101 Stat. 1329.

The Federal Environmental Pesticide Control Act of 1972, enacted as P.L. 92-516, amended the 1947 Federal Insecticide,

Fungicide, and Rodenticide Act (P.L. 80-102, June 25, 1947, 61 Stat. 163).

The 1947 statute (FIFRA) prohibited the sale or distribution of "economic poisons," provided for the registration of such materials, and authorized penalties for violation of the Act. The 1972 amendments established, under the Administrator of EPA, a program for controlling the sale, distribution, and application of pesticides through an administrative registration process. The amendments provided for classifying pesticides for "general" or"restricted" use. "Restricted" pesticides may only be applied by or under the direct supervision of a certified applicator.

The amendments also authorized experimental use permits and provided for administrative review of registered pesticides and for penalties for violations of the statute. States were authorized to regulate the sale or use of any pesticide within a state, provided that such regulation does not permit any sale or use prohibited by the Act.

The Endangered Species Act of 1972 amended FIFRA to define imminent hazard to include situations involving unreasonable hazard to the survival of a species declared by the Secretary of the Interior to be endangered or threatened (P.L. 93-205, December 28, 1987, 87 Stat. 903).

The 1975 amendments to FIFRA (P.L. 94-140, November 28, 1975, 89 Stat. 751) required that the EPA Administrator consider the impacts of regulatory actions on production and prices of agricultural commodities and to notify the Secretary of Agriculture in advance of related rulemaking. Experimental use permits were also authorized for agricultural research activities.

The 1978 amendments to FIFRA (P.L. 95-396, September 30,1978, 92 Stat. 819) reauthorized appropriations and stipulated the authorized uses of data supplied by an applicant seeking to register pesticides, as well as procedures to be followed by EPA if additional data is needed to support an existing pesticide registration. In addition, the amendments provided clarification of State authority to regulate the sale or use of pesticides and stipulated that States have primary responsibility for pesticide use violations, provided that they have adopted adequate pesticide use laws and regulations.

Amendments enacted in 1983 (P.L. 98-201, December 2, 1983, 97 Stat. 1379) authorized appropriations through FY 1984. The 1987 amendments to FIFRA (P.L. 100-202, December 22, 1987, 101 Stat. 1329) prohibited EPA from canceling any pesticide registrations prior to September 15, 1988, for failure to comply with EPA's endangered species-related labeling regulations.

Amendments were again made on October 25, 1988, P.L. 100-532, The Federal Insecticide, Fungicide, and Rodenticide Act Amendments (102 Stat. 2655, 2677, 2679). Substantive changes which impact the Fish and Wildlife Service were not made.

As part of amendments passed on November 28, 1990 (P.L. 101-624, 104 Stat. 3628), a Biological Pesticide Handling Study was mandated. The study was to review the biological control programs and registration procedures utilized by the Food and Drug Administration, the Animal and Plant Health Inspection Service, and the Environmental Protection Agency. Upon completion of the study, the Secretary of the Interior, in cooperation with the Administrator of the EPA and the Secretary of Agriculture were to begin an educational outreach program to inform persons engaged in agricultural commodity production of any proposed pesticide labeling programs or requirements which may be imposed in compliance with the Endangered Species Act. A study to identify reasonable and prudent means available to implement the endangered species labeling program in compliance with the Endangered Species Act was also mandated.

Amendments were again made on December 13, 1991(P.L. 102-237, 105 Stat. 1894-1896) which changed registration and re-registration requirements for pesticides. The last legislative action taken on this act was in the August 3, 1996 amendments (P.L. 104-170, 110 Stat. 1492). As with the 1991 amendments, changes were made to pesticide registration and re-registration procedures. Finally, the 1996 amendments also extended the authorization of appropriations.

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Title 27: Alcohol, Tobacco Products, and Firearms

CHAPTER II: BUREAU OF ALCOHOL, TOBACCO, FIREARMS, AND EXPLOSIVES, DEPARTMENT OF JUSTICE

SUBCHAPTER C: EXPLOSIVES

PART 555: COMMERCE IN EXPLOSIVES

Subpart K: Storage

555.201 - General.

(a) Section 842(j) of the Act and Sec. 555.29 of this part require that the storage of explosive materials by any person must be in accordance with the regulations in this part. Further, section 846 of this Act authorizes regulations to prevent the recurrence of accidental explosions in which explosive materials were involved. The storage standards prescribed by this subpart confer no right or privileges to store explosive materials in a manner contrary to State or local law.

(b) The Director may authorize alternate construction for explosives storage magazines when it is shown that the alternate magazine construction is substantially equivalent to the standards of safety and security contained in this subpart. Any alternate explosive magazine construction approved by the Director prior to August 9, 1982, will continue as approved unless notified in writing by the Director. Any person intending to use alternate magazine construction shall submit a letter application to the regional director (compliance) for transmittal to the Director, specifically describing the proposed magazine. Explosive materials may not be stored in alternate magazines before the applicant has been notified that the application has been approved.

(c) A licensee or permittee who intends to make changes in his magazines, or who intends to construct or acquire additional magazines, shall comply with Sec. 555.63.

(d) The regulations set forth in Sec. 555.221 through 555.224 pertain to the storage of display fireworks, pyrotechnic compositions, and explosive materials used in assembling fireworks and articles pyrotechnic.

(e) The provisions of Sec. 555.202(a) classifying flash powder and bulk salutes as high explosives are mandatory after March 7, 1990: Provided, that those persons who hold licenses or permits under this part on that date shall, with respect to the premises covered by such licenses or permits, comply with the high explosives storage requirements for flash powder and bulk salutes by March 7, 1991.

(f) Any person who stores explosive materials shall notify the authority having jurisdiction for fire safety in the

locality in which the explosive materials are being stored of the type, magazine capacity, and location of each site where such explosive materials are stored. Such notification shall be made orally before the end of the day on which storage of the explosive materials commenced and in writing within 48 hours from the time such storage commenced.

(Paragraph (f) approved by the Office of Management and Budget under control number 1140-0071)

[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981, as amended by T.D. ATF-293, 55 FR 3722, Feb. 5, 1990; T.D. ATF-400, 63 FR 45003, Aug. 24, 1998; ATF-11F, 73 FR 57242, Oct. 2, 2008]

27 CFR Part 555.106 Certain prohibited distributions.

(a) A licensee or permittee may not distribute explosive materials to any person except—

(1) A licensee;

(2) A holder of a user permit; or

(3) A holder of a limited permit who is a resident of the State where distribution is made and in which the premises of the transferor are located.

(b) A licensee shall not distribute any explosive materials to any person:

(1) Who the licensee knows is less than 21 years of age;

(2) In any State where the purchase, possession, or use by a person of explosive materials would be in violation of any State law or any published ordinance applicable at the place of distribution;

(3) Who the licensee has reason to believe intends to transport the explosive materials into a State where the purchase, possession, or use of explosive materials is prohibited or which does not permit its residents to transport or ship explosive materials into the State or to receive explosive materials in the State; or

(4) Who the licensee has reasonable cause to believe intends to use the explosive materials for other than a lawful purpose.

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(c) A licensee shall not distribute any explosive materials to any person knowing or having reason to believe that the person:

(1) Is, except as provided under § 555.142 (d) and (e), under indictment or information for, or was convicted in any court of, a crime punishable by imprisonment for a term exceeding 1 year;

(2) Is a fugitive from justice;

(3) Is an unlawful user of marijuana, or any depressant or stimulant drug, or narcotic drug (as these terms are defined in the Controlled Substances Act, 21 U.S.C. 802);

(4) Was adjudicated as a mental defective or was committed to a mental institution;

(5) Is an alien, other than an alien who—

(i) Is lawfully admitted for permanent residence (as that term is defined in section 101(a)(20) of the Immigration and Nationality Act (8 U.S.C. 1101));

(ii) Is in lawful nonimmigrant status, is a refugee admitted under section 207 of the Immigration and Nationality Act (8 U.S.C. 1157), or is in asylum status under section 208 of the Immigration and Nationality Act (8 U.S.C.1158), and—

(A) Is a foreign law enforcement officer of a friendly foreign government, as determined by the Attorney General in consultation with the Secretary of State, entering the United States on official law enforcement business, and the shipping, transporting, possession, or receipt of explosive materials is in furtherance of this official law enforcement business;

(B) Is a person having the power to direct or cause the direction of the management and policies of a corporation, partnership, or association licensed pursuant to section 843(a), and the shipping, transporting, possession, or receipt of explosive materials is in furtherance of such power;

(C) Is a member of a North Atlantic Treaty Organization (NATO) or other friendly foreign military force, as determined by the Attorney General in consultation with the Secretary of Defense, (whether or not admitted in a nonimmigrant status) who is present in the United States under military orders for training or other military purpose authorized by the United States, and the shipping, transporting, possession, or receipt of explosive materials is in furtherance of the military purpose; or

(D) Is lawfully present in the United States in cooperation with the Director of Central Intelligence, and the shipment, transportation, receipt, or possession of the explosive materials is in furtherance of such cooperation;

(6) Has been discharged from the armed forces under dishonorable conditions; or

(7) Having been a citizen of the United States, has renounced citizenship.

(d) The provisions of this section do not apply to the purchase of commercially manufactured black powder in quantities not to exceed 50 pounds, intended to be used solely for sporting, recreational, or cultural purposes in antique firearms or in antique devices, if the requirements of § 555.105(a)(7) or (b)(7) are fully met.

[T.D. ATF–87, 46 FR 40384, Aug. 7, 1981. Redesignated by T.D. ATF–487, 68 FR 3748, Jan.24, 2003. ATF No. 1, 68 FR 13790, Mar. 20, 2003]

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FAA
Airports
Airport Safety and Operations Division

Calendar Year 2013 Part 139 CertAlert Log

NUMBER	DATE	TOPIC	CONTACT
13-06	21 Nov 2013	Field Condition Reporting (FICON) Limitations When Using the NOTAM Manager System Drop-Down List	Phillip Davenport (202) 267-7072
13-05	25 Sep 2013	Publication Announcement: JO 7930.2N, Notices to Airmen (NOTAM)	Phillip Davenport (202) 267-7072
13-04	29 July 2013	Additional Precautions for Approaching Aircraft with Ballistic Parachutes, Ejection Seats, and Airbags	Marc Tonnacliff (202) 267-8732 Randy Moseng (404) 474-5114
13-03	7 May 2013	Coordination of High Risk Flight Test Activities at Airports	Randy Moseng (404) 474-5114
13-02	15 Mar 2013	Final Rule: Safety Enhancements, Certification of Airports (78 FR 3311)	Ken Langert (202) 493-4529
13-01	30 Jan 2013	Federal and State Depredation Permit Assistance	John R. Weller (202) 267-3778
~~11-04~~	~~10 Nov 2011~~	~~Announcement of Order JO 7930.2M, Notices to Airmen (NOTAM), Change 2; Notice JO 7930.93, Reporting of Field Conditions (FICON); and Notice JO 7930.94, Use of 'Work in Progress' in Notices to Airmen~~	~~Phillip Davenport~~
~~04-13~~	~~28 Oct 2004~~	~~Rocket Deployed Emergency Parachute Systems – Cancelled~~	~~K. Gilliam~~

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FAA
Airports
Airport Safety and Operations Division

Calendar Year 2014 Part 139 CertAlert Log

NUMBER	DATE	TOPIC	CONTACT
14-03	25 June 2014	**Preventive Maintenance of In-Pavement Lighting Systems**	Randy Moseng (404) 474-5114 Alvin Logan (202) 267-8743
14-02	2 Apr 2014	**Increase in the Numbers of Vehicles and/or Equipment Inadvertently Hitting and Damaging Airplanes in the Ramp/Gate Areas**	Brian Rushforth (202) 267-9617
14-01	26 Feb 2014	**Seasonal Mitigation of Hazardous Species at Airports: Attention to Snowy Owls**	John Weller (202) 267-3778 Amy Anderson (202) 267-7205

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Example Data Sheets

WILDLIFE REPORT - MASTER

Exhibit H

DATE	TIME	LOCATION	ANIMAL/SPECIES	ACTION TAKEN/METHOD OF REMOVAL	SIGHTED BY

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APPENDIX C

Deterrent Equipment Product Data

Reed-Joseph
INTERNATIONAL COMPANY

800 MAIN STREET, 38701
or
P.O. BOX 894, 38702
GREENVILLE, MS

1.800.647.5554

Tel: 662.335.5822
Fax: 662.335.8850

sales@reedjoseph.com

SAME DAY SHIPPING

Reed-Joseph
INTERNATIONAL COMPANY

OVER 55 YEARS

ESTABLISHED IN 1953

OVER 55 YEARS OF EXCELLENCE
IN BIRD AND WILDLIFE CONTROL

www.reedjoseph.com

PYROTECHNICS

SCREAMER SIREN

Launched from a single or double shot launcher with the aid of a 6mm blank primer, the 15mm Screamer Siren travels 250 to 300 feet, making a siren-like sound as it flies.

BIRD BANGER

Launched in the same manner as the Screamer Siren, the loud 15mm Bird Banger travels 100 to 150 feet down range before exploding with a very loud report.

SCREAMER BANGER ROCKET

Triples the range of our Bird Banger. Simply slide a Bird Banger into the attached collar, load the Rocket into the launcher muzzle, as you would load a Screamer Siren, and fire. The cartridge travels approximately 300 to 350 feet down range making a screaming noise followed by the loud report from the attached Bird Banger.

6mm BLANK PRIMERS

These are provided at no charge, with all our 15mm pyrotechnic orders.

EYE & EAR PROTECTORS

Eye and Ear Protectors are recommended with all our **SCARE-AWAY** products.

SINGLE SHOT LAUNCHER

Our Single Shot Launcher offers rugged dependability and low price. It launches our 15mm cartridges.

DOUBLE SHOT LAUNCHER

Automatically re-cocks after the first 15mm cartridge is fired, allowing a second cartridge to be quickly fired.

SEVEN SHOT LAUNCHER

The RG-46 is the best of its kind. It fires more rapidly and with much more ease than the RJ-1 Single Shot Launcher or the RJ-2 Double Shot Launcher.

Available to Government Agencies only.

CAPA & LAUNCHER

For high soaring raptors or birds in hard-to-reach places. Using a 4 caliber Very-type launcher, CAPA carries the cartridge 1,000 feet down range, before making a loud 150 decibel report.

TYPE IV STORAGE MAGAZINE

Our ATF&E approved, prefabricated and portable, indoor storage magazine features an 8 gauge steel exterior, a half inch plywood interior and 2 hasps & hoods.

Available in two sizes:
30" x 16" x 14.5" Weight 90 lbs.
22.5" x 11.5" x 14.5" Weight 64 lbs.
ATF&E approved Heavy Duty Lock and Key Set - Two locks, keyed alike, with two identical keys.

SCAREY MAN®

This human-sized inflatable scarecrow combines sudden movement as it inflates with a siren-like noise, a bird-phobic color, and illumination at night. Frightens away animal pests as it inflates and deflates on a controlled time basis.

EVIL EYE BALLOONS

These 16 inch diameter, heavy-duty, vinyl balloons discourage birds from roosting around gardens, boats, marinas, buildings, airplane hangars, fruit and berry crops, livestock pens and other problem areas.

REJEX-IT® MIGRATE™ FOR AGRICULTURE

Makes treated cherries, grapes and blueberries unpalatable to birds. It causes them no harm, and they will avoid feeding where it is present.

REJEX-IT® MIGRATE™ FOR TURF

When you spray this food grade biodegradable repellent on turf, watch the unwanted geese and ducks disappear!

One gallon covers 16,000 square feet.

REFLECTIVE TAPE

Hang in strips or suspend between poles. The slightest breeze causes the Mylar® to flash and crackle, irritating and confusing birds.

Available in two sizes:
0.5" x 250' and 1.25" x 250'

BIRD GARD®

Features solid-state electronics mounted inside a NEMA-type control box for weather protection. Covers up to 6 acres. 4 built-in amplifiers and 4 external speakers provide high-volume, crystal-clear digital sound. Mounts easily to a post or pole.

MOBILE BIRD GARD®

Target your bird dispersal program more accurately with our Mobile Bird Gard®. Installation is a snap! Simply plug the sound generator into your vehicle's cigarette lighter and place the magnet-based speaker on the roof.

LP GAS CANNONS AND ACCESSORIES

SCARE-AWAY LP Gas Cannons can protect your investment from bird and wildlife infestation. They automatically produce harmless thunderclap bangs to disperse birds and wildlife from areas such as crops, orchards, vineyards, campuses, golf courses, fish ponds, parks, airfields, and landfills. **SCARE-AWAY** LP Gas Cannons are powered by the same 5 gallon LP gas cylinders used for outdoor grills. The cost for this valuable protection – pennies a day!

OUR SCARE-AWAY LP GAS CANNONS

are available in three models. Choose the model which best suits your needs.

M3 produces single bangs which can be regulated from one bang every 30 seconds to one bang every 20 minutes. The M3 utilizes flint ignition. Each flint produces up to 1,000 ignitions.

M4 produces single bangs identical to the M3, and uses a piezo ignition system, which operates without batteries or electricity and produces up to 200,000 ignitions.

M8 Multi-Bang produces random series of single, double, and triple-shot clusters. Time between series may be adjusted from every 30 seconds to every 20 minutes.

MULTIPLE SHOTS AT IRREGULAR INTERVALS DURING A SHORT PERIOD OF TIME HAVE PROVEN TO BE EXTREMELY EFFECTIVE IN DISPERSING BIRD AND WILDLIFE PESTS.

ROTOMAT

The **SCARE-AWAY** LP Gas Cannon can also be mounted on a **ROTOMAT** revolving platform, as shown here, that allows the cannon to change direction each time it fires, enhancing the effectiveness.

CLOCK TIMER

Our battery operated Clock Timer does a superb job of activating and deactivating the **SCARE-AWAY** LP Gas Cannon automatically. No winding is necessary. It will operate for an entire season on just one AA battery.

AVIAN DISSUADER™

Point the hand-held laser in the direction of the birds. The laser beam will startle, frighten, and drive them away.

Range is at least half a mile.

There are 2 versions - 650nm Red and 532nm Green:

Red Laser is most effective in low light conditions.

Green Laser remains effective in higher ambient light conditions than the Red Laser.

SAME DAY SHIPPING

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BIRD SPIDER™ from **BIRD•B•GONE INC**

Installation Instructions

- Stainless Steel "Arms" move with the breeze, which deters birds from landing and causing damage.
- Bird•B•Gone Bird Spider has no moving parts in the base unit, which makes it extra sturdy and stable. **NO ASSEMBLY REQUIRED!**
- Convenient / FREE attachments make Bird Spider Adaptable!
- Available in Four Widths! 2',4',6' and 8' Diameters.
- Super Easy to Install...and Maintenance Free!

The Bird Spider is Ideal For:

- Signs
- Parking Lot Lights
- Street Lights
- A.C. Units
- Rooftops
- Boats
- Building Maintenance
- AND MORE!

BIRD•B•GONE INC
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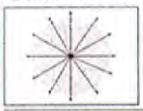
For Customer Support,
Call ***1-800-392-6915***

INSTALLATION INSTRUCTIONS FOR BIRD•B•GONE BIRD SPIDER

1. Ensure mounting surface is clean of bird feces and debris before installing any bird deterrent, including the Bird Spider.
- Use Bird-B-Gone Disinfectant or appropriate disinfectant to prepare the surface.



Bird Spider Arm "tips" should overhang mounting surface by at least 2".

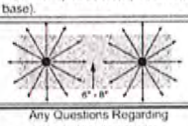
2. Select the appropriate Bird Spider (4' or 8') depending on the surface of coverage.
- It is important that the "tips" of the arms extend several inches over the outside surface(s).

3. Stainless Steel arms must have room to move with the air.
- Do not mount Bird Spider in an area where the arms will be suppressed from movement or blocked by walls.

4. Bird Spider Arm Tips Should be no more than 2-3" above mounting surface.

5. If the Bird Spider requires gluing for the installation, the PVC adapter must be used.
- **DO NOT GLUE THE BOTTOM OF THE BASE UNIT WITHOUT INSTALLING THE PVC BASE.**
- Use Bird-B-Gone Adhesives, available direct from Bird-B-Gone

6. If installing more than one Bird Spider in a row, be sure that they are installed 6-8' from arm tip-to-arm tip (not base-to-base).



BOAT ADAPTATION:

Bird Spider Boat Base:
- Attach the Bird Spider Base directly to the Boat Base with the screws supplied.
  - **Do not mount onto the PVC supplied attachment first.**
- Each of the four "corners" of the Bird Spider Boat Base has holes.
- This makes it easy to "bungee" or tie down the base to the canopy top, cover, etc. ... and also allows for easy removal of this ideal boat protective device!

Bird Spider Sandbag Base:
- Use the Sandbag Base on Boats where the Bird Spider Boat Base is not appropriate (i.e. Bimini Tops and larger areas).
- Attach the Bird Spider Base directly to the Sandbag Base with the screws supplied with Sandbag Base. Follow instructions supplied with screws. **(Screws used for the PVC attachment will not work with the Sandbag Base.)**
  - Do not mount onto the PVC supplied attachment first.
- Although the Bird Spider Sandbag Base is weighted, it should always be secured to the boat.
- High winds or extreme shifts in weather could remove the Sand Bag Base and cause damage if it is not properly secured.

Any Questions Regarding **Bird Spider** Installation:
Call **1-800-392-6915**

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