WILDLIFE HAZARD ASSESSMENT
for the
YAKUTAT AIRPORT, YAKUTAT, ALASKA

(June 1999 through October 1999)

Submitted by:

United States Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services
720 O'Leary St., NW
Olympia, Washington 98502
(360) 753-9884

Aaron Spencer
Wildlife Specialist

Michael A. Linnell
Staff Wildlife Biologist WA/AK

Corey Rossi
Alaska District Supervisor

Work Performance per Cooperative Service Agreement No. 98-73-02-5286-RA
Project was monitored by J. Gary Oldenburg, State Director, WA/AK/HI/Pacific Islands

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LIST OF ACRONYMS

AC	Advisory Circular
ADF&G	Alaska Department of Fish and Game
AGL	Above Ground Level
AKDOT&PF	Alaska Department of Transportation and Public Facilities
AOA	Air Operating Area
CFR	Codes of Federal Regulation
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
MOU	Memorandum of Understanding
NOTAM	Notice to Airmen
USFS	United States Forest Service
USFWS	U.S. Department of Interior, Fish and Wildlife Service
VOR	VHF Navigational Facility-omni Directional Course Only
WHA	Wildlife Hazard Assessment
WHMIS	Wildlife Hazard Management Information System
WHMP	Wildlife Hazard Management Plan
WS	U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (formerly Animal Damage Control [ADC])
YAK	Yakutat Airport

1.0 Introduction

1.1 Overview of Wildlife Hazards to Aircraft

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

The FAA is responsible for setting and enforcing the Federal Aviation Regulations (FAR) and policies to enhance public safety. To ensure compliance with Codes of Feral Regulations (CFR) Part 139.337 (Appendix 1), the FAA requires certified airports to conduct a wildlife hazard assessment (WHA)/ecological study, and if necessary, establish a wildlife hazard management plan (WHMP) when any of the following events occur on or near an airport:

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

There are many actions that can be taken to decrease wildlife hazards, depending on the species, time of year, why they are using the airfield, habitat characteristics on and around the airfield, and a host of other variables. It is therefore, a necessity to fully understand an animal's biology, particularly in relation to specific environmental characteristics when establishing a wildlife control program. WHAs provide the framework through which a more complete and site-specific understanding of wildlife hazards on an airport are developed. These studies typically last a year because wildlife populations, especially migratory birds, exhibit seasonal fluctuations in behavior and abundance. On completion of the studies, recommendations to reduce wildlife hazards can be made which are based on an analysis of the data collected. If the study determines that significant wildlife hazards are present, a WHMP is written that addresses the responsibilities, policies, and procedures necessary to reduce wildlife hazards. The WHA provides the basis from which the management plan is developed. WHMPs are written in accordance with CFR 14, 139.337, subpart (c), (d) and (e) and are the responsibility of the airport.

1.2 Legal Authority of Wildlife Services

The U.S. Department of Agriculture, Wildlife Services (WS) (the name was officially changed from Animal Damage Control [ADC] in August of 1997) program has a Memorandum of Understanding (MOU) with the FAA (Appendix 2) to resolve wildlife hazards to aviation, thus enhancing public safety. The MOU establishes that WS has the expertise and will provide technical and operational assistance (if funded by an airport) to alleviate wildlife hazards at airports. WS may conduct a WHA to serve as a basis for theWHMP, but the responsibility of development, approval, and implementation of the WHMP still lies with the airport manager.

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

The MOU and referenced legislation allow WS to conduct initial on-site investigations, biological assessments (short-term studies), WHAs, wildlife management operations, and complete WHMPs for airports.

Due to concerns over the hazards presented by wildlife, and a concern for public safety resulting from several pilot-reported wildlife strikes at Yakutat Airport (YAK), the Alaska Department of Transportation (AKDOT&PF) entered into agreement with WS to conduct a WHA for YAK. This WHA was conducted from June 1999 - October 1999 per agreement number 98-73-02-5286-RA. During the course of the study, responsibilities for managing airport wildlife hazards remained with the airport manager.

2.0 Objectives

The objectives of this WHA were to:

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

3.0 Background

3.1 General Background of YAK

YAK is an approximately 3,500 acre facility located at 59°30' north latitude and 139°39' west longitude. The airport is roughly three miles southeast of the city of Yakutat (Appendix 3). Airport lands are part of the Yakutat Forelands, a low-lying, gently sloping outwash plain, situated between the Gulf of Alaska and the St. Elias Mountains. The Yakutat Forelands were created by the receding Piedmont Glacier which once occupied Yakutat Bay. The area remains interspersed with an extensive network of rivers, streams, and sloughs.

East of Yakutat are high glaciated mountains. The Boundary Fault and numerous subsidiary faults trend northwest-southwest through the mountains and may be considered active. Seismic designs for the Yakutat area consider the likelihood of a magnitude seven or eight earthquake (on the Richter scale) in the vicinity from Yakutat to Cordova.

The airport facility is owned by the State of Alaska and operated by the AKDOT&PF. The airport elevation ranges from 11 to 33 feet on the runway, with a mean elevation of 32 feet above sea level. Average temperatures range from 26° in January to 53° in July and August. Mean annual precipitation is approximately 151.25 inches. Mean annual snowfall is 202.7 inches, but more than 400 inches have been reported in a season, with snowfall rapidly accumulating on the runway. The moist air rising from the Gulf of Alaska toward the St. Elias Range results in overcast conditions with rain or snow 80 percent of the year. Wide variations in weather conditions can occur in relative short distances. The prevailing wind is easterly in the winter and east-southeast in the summer. Sudden wind gusts have been known to reach speeds of 90 miles per hour.

YAK serves as one of the two ports of transportation for the community of Yakutat. The only city within a nearly 400-mile stretch of the Gulf of Alaska, Yakutat lacks any road, rail, or marine highway connections to other communities. Waterborne access is limited to oceangoing vessels. The runway system, built by the U.S. Army Air Corps in 1942, consists of two runways capable of supporting turbine-powered traffic. Runway 11/29 is paved and is 7,749-foot long by 150-foot wide. Runway 2/20 consists of the original 6-inch thick concrete squares and is 6,663 feet (shortened from 7,813 feet) long by 150 feet wide. Due to the placement of navigational aids that allow instrument approaches, and its orientation into prevailing winds, Runway 11/29 serves as the primary runway for YAK, and is maintained year-round. During non-winter months Runway 2/20 is also used, and is estimated to accommodate approximately 15 percent of heavy aircraft operations.

The summer months see a considerable increase in aircraft usage. The number of small aircraft movements increases due to charter service for fishing and hunting, as well as cargo hauling to remote camps. Heavy aircraft flights also increase during the summer months due to the fishing season. The

airport is used by a wide variety of aircraft including Boeing 737's, Douglas DC-3's, Curtis C-46's, many single-engine planes, and occasional helicopters.

3.2 History of Wildlife Hazards at YAK

3.2.1 Documented Wildlife Aircraft Strikes

The definition of a wildlife strike used in this study was developed by Bird Strike Committee Canada (Transport Canada 1994) and has been endorsed by the International Civil Aviation Organization, Bird Strike Committee USA, Bird Strike Committee Europe, FAA and the U.S. Air Force. A wildlife strike is deemed to have occurred whenever:

1. A pilot reports a strike,
2. Aircraft maintenance personnel identify damage as having been caused by a bird or mammal strike,
3. Personnel on the ground report seeing an aircraft strike one or more birds or mammals,
4. Bird or mammal remains, in whole or part, are found on any airside pavement area or within 60 m (200 feet) of a runway, unless another reason for the birds's or mammal's death is identified.

The definition of a near miss used in this study is defined as: An incident in which either the aircraft or animal takes evasive action to avoid a collision.

Wildlife strike data provides valuable information on wildlife hazards at airports, including the species that are struck, seasonality, and time of day. National statistics for the period of 1992-1996 based on pilot-reported strikes indicated that gulls (31%), waterfowl (12%), blackbirds/starlings (13%), pigeons/doves (11%), raptors (10%), corvids (crows, ravens, magpies, etc. [2%]), swallows (2%), and shorebirds (2%) were responsible for the majority of strikes over the past five years (Dolbeer et al. 1995, Cleary et al. 1997). Of these strikes, gulls and waterfowl each damaged aircraft 16% of the time, raptors 8%, blackbirds 3%, and corvids 1%. Fifty-five percent of the strikes occurred at altitudes ≤100 feet and 80% occurred at ≤1,000 feet - an altitude which approximates the height at which aircraft are generally clear of the airport property. The data also indicated that most bird strikes occurred during the late spring through early fall (May - October) with the fewest strikes occurring during the winter months of December through February. Conversely, mammal strikes were most abundant during the late summer and fall months of June through November. Finally, most of the strikes occurred during the day (63%), followed by night (23%), then dawn/dusk (10%). These data should be interpreted cautiously, however, because it has been demonstrated that pilots are less likely to report strikes around the crepuscular periods of dawn and dusk (Linnell et al. 1999), presumably due to decreased visibility. Based on pilot-reported data (Cleary et al. 1997), the Boeing 737 (19%) and DC-9/MD80 (9%) were

involved in more strikes than any other type of aircraft, probably because they were flown most frequently. No other aircraft comprised more than 5% of the reported strikes from 1992-1997.

Wildlife strike rates, the number of strikes per 10,000 aircraft movements, provide a useful index for assessing the severity of wildlife hazards at a given airport and for monitoring hazard abatement efforts. Consequently, the number of aircraft operations, coupled with the accurate collection of wildlife strike data should be a priority for airport managers. Wildlife strike statistics based solely on pilot reports are generally unreliable and yield incomplete information because most pilots do not report strikes. By collecting the remains of dead wildlife found on runways during routine runway inspections, airport managers can obtain information that would have otherwise been unavailable (Linnell et al. 1996, 1999), augmenting a more accurate assessment of the actual wildlife strike situation. This is because the proportion of strikes reported by pilots often vary due to factors such as decreased pilot acuity toward wildlife during critical phases of flight, size of the bird or mammal, group size, weather conditions, time of day, or heightened pilot awareness during migratory seasons (Linnell et al. 1999). In the future, pilots and airport personnel should be strongly encouraged to complete and submit the FAA Strike Report Form (FAA 5200-7 [Appendix 4]) every time a collision with wildlife occurs or the remains of a dead bird(s) are found on the runway. The FAA has recently setup a system for reporting strikes via the Internet at the following address: ***http://www.faa.gov/arp/birdstrike/*** for those with Internet access. All wildlife remains that are found should be retained until they can be positively identified by a qualified individual, or if the remains are unidentifiable, feel free to send them to us for identification. If we are unable to determine the type of bird, we will send them to the Smithsonian Institute (Division of Birds, NHBE-605 MRC 116, Washington, D.C. 20560) for microscopic feather identification.

Table 1. List of all wildlife strikes and near misses that were reported at YAK, Alaska, September 1991-October 1999.

Date	*Type of Aircraft*	*Number/Species*	*Incident Type*	*Comments*
8/17/91	B-737	1 Eagle	Strike	Struck during landing roll. No damage.
8/21/91	B-737	2-10 Gulls	Strike	Struck during landing roll. No damage.
7/1/99	Twin Beechcraft	1 Semipalmated Plover	Near miss	Bird dived out of path of aircraft on approach to 29.
9/29/99	Cessna	1 Moose	Near miss	Moose running on runway. Pilot had to speed up to get past without hitting during landing roll.

The incidents in Table 1 were gathered from past reported bird strikes and observations made during the WHA. It is estimated that only 20% of all wildlife strikes are reported to the FAA (Linnell 1996, 1999; Cleary et. al. 1997). The lack of reporting can give airport managers (and others) an inaccurate assessment of wildlife hazards to aviation safety.

3.2.2 Wildlife Damage to Airfield Equipment

Some years, damage to runway lighting by bears is a frequent occurrence during non-winter months. Damage ranges from a broken bulb or lense to the entire light being broken off and pulled away from the base. The frequency of this type of damage varies greatly from year to year, with no damage to lighting structures being reported during this WHA.

The damming of drainage ditches and culverts (by beaver) causes flooding of adjacent road beds, and may result in a washout of the road itself. These beaver damming activities may also result in flooding of the runway lighting system, the safety area, and the runway itself. Extensive beaver damming was observed during this WHA. The increased water caused by dammed ditches attracted waterfowl into close proximity of the runway, especially at the approach end of Runway 20. The flooding also caused trees adjacent to the ditches to die, increasing their attractiveness to perching raptors such as the red-tailed hawks, while opening up the over-water canopy to dabbling waterfowl and shorebirds.

Wildlife perimeter fencing is not currently installed around YAK. However, there is limited security fencing to restrict vehicles from accessing the airfield. The fencing on the west end of Runway 11/29 was damaged when a moose rammed a gate in order to exit the airport. A bear also seeking to leave the airport tore through the chain link fence about 50 meters from the end of the fencing. The resulting hole was mended using wire.

3.3 Current Wildlife Hazard Management

Wildlife hazard management at YAK has traditionally consisted of periodic beaver removal and the use of pyrotechnics to haze wildlife during peak hours of operation surrounding commercial airline activity. All pyrotechnic use has been handled on-site by AKDOT&PF personnel. Beaver removal in the past attempted to target individual beavers responsible for damming runway and road drainage culverts and ditches. Trapping was conducted as needed using private local trappers and only during the state's open trapping season. YAK management allowed private trappers access to the airfield in order to trap beaver during these winter months. In addition to the removal of beavers, airport personnel have also removed some dams near the airfield. Despite these efforts, the beavers remain persistent in damming waterways around the airport.

Airport personnel respond to pilot requests to disperse bears, moose, and birds on the runways and safety areas when YAK personnel are available. The airport maintains daily records of wildlife

observations and hazing actions that are taken. YAK possesses current permits from the United States Fish and Wildlife Service (USFWS) and the Alaska Department of Fish and Game (ADF&G) for the hazing and taking of migratory birds. USFWS and ADF&G permits are also currently held for the hazing of bald eagles. A copy of each permit is provided in Appendix 5.

4.0 Legal Status of Key Species

None of the species observed during the WHA are currently listed as threatened or endangered by the USFWS. A listing of threatened and endangered species in Alaska is provided in Appendix 6. All birds observed on the airfield are afforded protection under the Migratory Bird Treaty Act of 1918, hence permits are required from both USFWS and ADF&G when using lethal control. Bald eagles are further protected by the Bald Eagle Protection Act of 1940. This act makes it illegal to remove bald eagle nests. In instances of eagles nesting on airport property, where they are creating an aircraft hazard, contact USFWS for guidance (Appendix 7).

Before taking persistent beaver, moose and brown bear, a separate permit must be issued by ADF&G. The state definition of "take" includes the harassment of wildlife.

5.0 Methods

Five different survey types were employed during the course of this study at YAK. While the objective of each survey type varies, they all share the same general purpose of identifying wildlife hazards to aviation safety. The five survey types represent the bulk of the observations made during the WHA. Observations were recorded on WS Form 121-R, Airport Observation Sheet (Appendix 8) and a Runway Count Data Form. A brief description of these survey types follows.

5.1 Standardized Surveys

Standardized Surveys were conducted twice weekly in order to quantify wildlife abundance and seasonal trends in specific areas throughout the airport. These surveys are designed to target periods of highest bird activity that occur in the early morning and late afternoon. While mammal activity was recorded when observed, the Standardized Surveys were designed with an emphasis on sampling bird activity. Ten observation points were established around the perimeter of the airfield (Figure 1). Each observation point was marked with orange flagging, and the survey plots covered a 400-yard radius from the center of each point. This 800-yard circle was called a survey plot. The objective of these Standardized Surveys was to identify population trends throughout the WHA, and to establish a baseline index by which future surveys could be compared. One Standardized Survey consists of a visit and observation at each of the ten plots. During each visit, all wildlife (bird or mammal) activity was recorded for a period of three minutes. A total of 74 surveys were conducted.

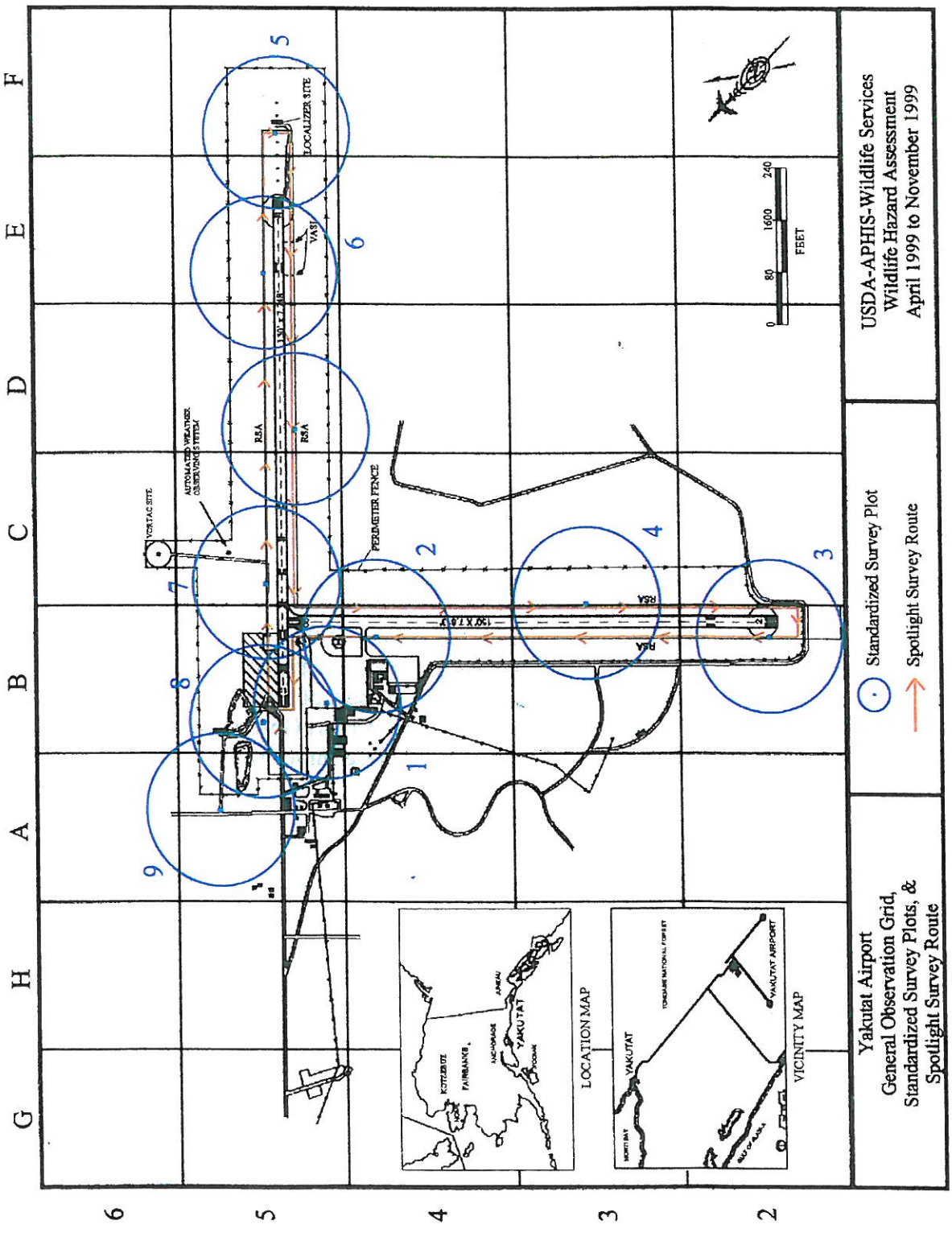
Yakutat Airport
General Observation Grid,
Standardized Survey Plots, &
Spotlight Survey Route
Standardized Survey Plot
Spotlight Survey Route
USDA-APHIS-Wildlife Services
Wildlife Hazard Assessment
April 1999 to November 1999
0
80
1600
240
FEET
LOCATION MAP
VICINITY MAP
YAKUTAT
YAKUTAT AIRPORT
PERIMETER FENCE
LOCALIZER SITE
AUTOMATED WEATHER
OBSERVATION SYSTEM
RSA
G
H
A
B
C
D
E
F
6
5
4
3
2

Figure 1.

5.2 Spotlight Surveys

Spotlight Surveys were conducted at least once per week and commenced approximately one hour after sunset. Due to limited darkness in the summer months, surveys were only conducted from August 1999 through October 1999. This survey consisted of driving a predetermined route around the perimeter of the runway and along the VHF Navigational Facility (VOR) access road at the north side of the airfield (Figure 1). Using a spotlight, all wildlife and their activity were recorded. A total of 12 surveys were conducted. While the intent of the Spotlight Survey was primarily to document the nocturnal activity of mammals, the presence and activity of birds were also noted when observed.

5.3 Track and Scat Surveys

The edges of each runway were patrolled on a daily basis to search for signs of bear, moose, or other noteworthy animal tracks or scat (fecal droppings). The presence of a wide, vegetation-free strip of fine gravel on each side of Runway 11/29 provided an ideal substrate for identifying wildlife tracks and runway crossing patterns. The species, number, location, and direction of travel of each track found on the south side of Runway 11/29 was noted. A weighted piece of chain-link fence was dragged over the gravel tracking strips every Friday to erase all tracks from the previous week. Old scat was removed from the area following their initial documentation.

5.4 Runway Counts

Runway Counts were conducted from a midfield point on each runway. The objective of these surveys was to identify species posing a direct hazard to aircraft during takeoff and landing, and to identify critical crossing patterns over the runways by hazardous species. Typically, two surveys per runway were conducted each week. However, the number of surveys may have varied depending on commercial flight arrivals and departures, as well as high wind or heavy rain conditions. All wildlife occurring on or over the runway surface were recorded.

5.5 General Observations

General Observations were conducted in a nonstandard manner and encompassed any noteworthy wildlife activity during a given study day. The objective of the General Observations was to identify general wildlife attractants, patterns, and any other information outside the scope of the formal surveys. While General Observations are difficult to quantify, they often provide the most useful observations in terms of identifying wildlife attractants and hazards. Offsite attractants were also noted through General Observations.

6.0 Results and Discussion

The results of the WHA surveys are grouped according to survey type. Where appropriate, trends in the occurrence of wildlife are noted and discussed. The actual threat of any given species depends on a number of factors. Among these factors are the mass, frequency, abundance, and behavior of the animal, as well as the type and speed of the aircraft involved. All wildlife observed at YAK have the potential to cause damage to an aircraft. Due to their behavior and/or use of certain cover types, some species are more likely than others to pose a threat to aircraft.

Identification of these species is integral to the effective control of wildlife hazards. The tables, figures, and discussion in this section deal primarily with these species and/or species groups. A complete list of the wildlife species observed during the WHA is provided in Appendix 9.

6.1 Standardized Surveys

Standardized Survey results are presented in Table 2. This table shows the descriptive statistics of *Abundance, Mean Abundance, Standard Error,* for each species. For the purpose of this table the *Abundance* represents the total number of individuals seen during the Standardized Surveys. The *Abundance* numbers do not represent a population density because the same individual may have been counted in multiple surveys. Because wildlife species observed on the airport could occur on the runway creating a potential risk to aircraft safety, this figure may also be defined as the number of surveyed wildlife hazard occurrences. *Mean Abundance* is the average number of individuals observed per Standardized Survey.

The *Standard Error* represents the variation in the number of individuals observed per survey. *Standard Error* can also be thought of as a confidence interval plus or minus (+/-) to the *Mean Abundance*. A species with a particularly high *Standard Error* is not likely to be seen in groups of a consistent size.

Table 2. Descriptive statistics for WHA Standardized Survey data at YAK, Alaska.

Species	*Abundance*	*Mean Abundance*	*Standard Error (+/-)*
American Kestrel	1	1	0
American Pipit	310	12	9
American Robin	85	1	1
Bald Eagle	58	1	1
Barn Swallow	74	1	3
Beaver	3	1	0

Species	*Abundance*	*Mean Abundance*	*Standard Error (+/-)*
Belted Kingfisher	10	1	0
Black-billed Magpie	10	1	0
Brown-headed Cowbird	4	2	1
Bufflehead	2	2	0
Chestnut-backed Chickadee	27	2	1
Common Goldeneye	59	3	2
Common Merganser	2	1	0
Common Murre	1	1	0
Common Raven	79	2	2
Common Snipe	140	5	6
Dark-eyed Junco	2	2	0
Dunlin	1	1	0
Fox Sparrow	56	3	3
Glaucous-winged Gull	2	1	0
Golden-crowned Sparrow	24	2	2
Great Blue Heron	3	1	0
Greater Scaup	4	4	0
Greater White-fronted Goose	11	11	0
Greater Yellowlegs	7	1	1
Green-winged Teal	13	4	6
Hermit Thrush	100	2	1
Lapland Longspur	67	7	9
Lincoln's Sparrow	1	1	0
Mallard	92	3	2
Marten	1	1	0

Species	*Abundance*	*Mean Abundance*	*Standard Error (+/-)*
Merlin	10	1	0
Northern Harrier	2	1	0
Northern Pintail	3	3	0
Northern Shrike	3	2	1
Northwestern Crow	1	1	0
Orange-crowned Warbler	70	2	1
Pectoral Sandpiper	32	4	4
Pine Siskin	103	4	3
Red Squirrel	73	1	0
Red-breasted Merganser	1	1	0
Red-necked Grebe	1	1	0
Red-tailed Hawk	6	2	1
Ring-necked duck	8	2	1
Rufous Hummingbird	3	1	0
Rusty Blackbird	42	8	12
Savannah Sparrow	473	2	1
Semipalmated Plover	59	1	1
Sharp-shined Hawk	1	1	0
Song Sparrow	2	2	0
Spotted Sandpiper	2	1	0
Steller's Jay	50	1	0
Trumpeter Swan	11	11	0
Unknown Passerine	299	3	4
Varied Thrush	3	1	0
White-winged Scoter	4	4	0

Species	*Abundance*	*Mean Abundance*	*Standard Error (+/-)*
Wilson's Warbler	16	3	2
Yellow Warbler	3	1	0
Yellow-rumped Warbler	3	3	0

For the purpose of simplification, species observed during Standardized Surveys were grouped into categories. Category classifications were based on the observed behaviors of each species during the assessment, as animals with similar behaviors and habitat requirements can generally be managed by similar methods. Figure 2 shows the species categories and the percentage each category made up of all the wildlife observed during Standardized Surveys. What follows is a more in-depth look at each category.

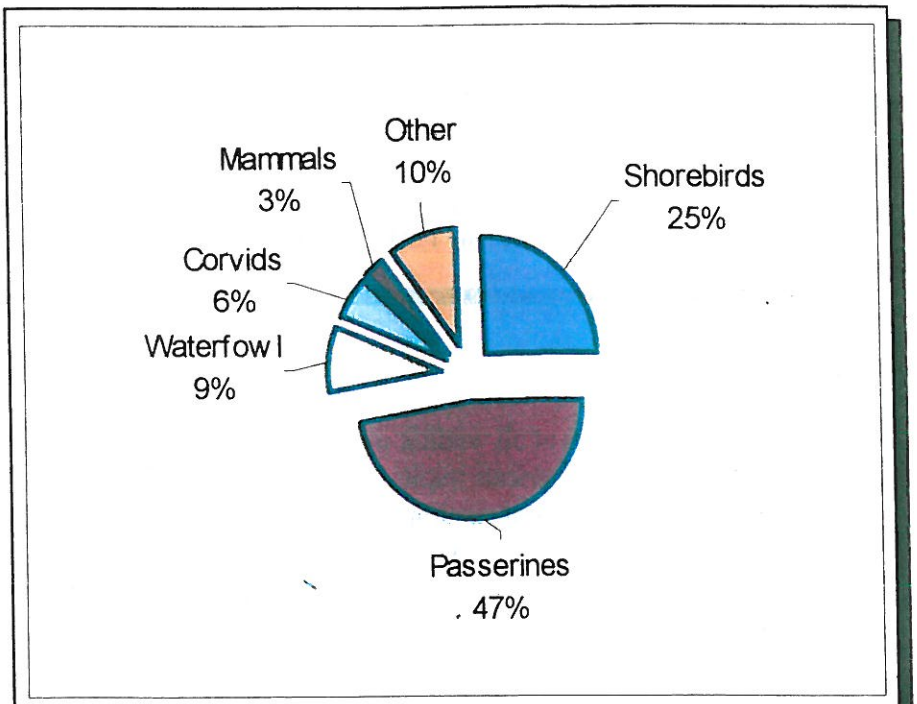

Figure 2. Relative percentage of occurrence of species by category from Standardized Surveys at YAK, June 1999 - October 1999.

6.1.1 Birds

Passerines

Passerines included warblers, robins, sparrows, pine siskin, thrushes, chickadees, and juncos. Large numbers of passerine species are located at YAK during the summer months. These birds usually can be found anywhere around the airport environment. Passerine observations peaked in the month of July (Figure 3), and the highest number were recorded at survey plot 3 (Figure 4). Due to the

relatively low hazard posed by this category of wildlife passerines were not the main focus of this WHA.

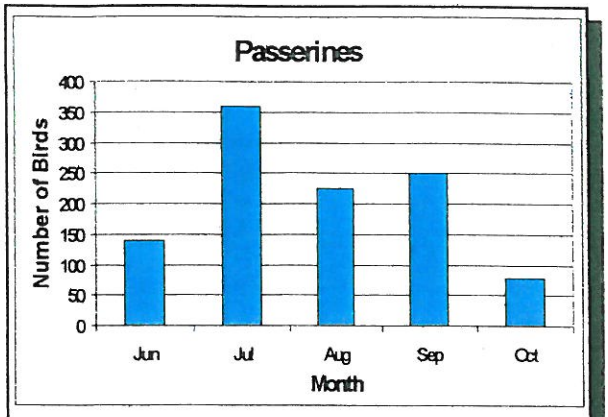

Figure 3. Total number of passerines observed at YAK during Standardized Surveys, June 1999 to October 1999.

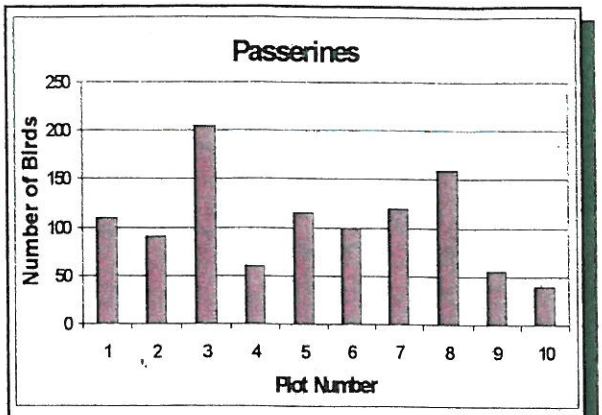

Figure 4. Total number of passerines observed at YAK by plot number from Standardized Surveys, June 1999 to October 1999.

Shorebirds

Shorebirds made up 25 % of all wildlife observations at YAK (Figure 1). The shorebird category of wildlife included the American pipit, spotted sandpiper, greater yellowlegs, common snipe, semipalmated plover, pectoral sandpiper, dunlin, and great blue heron. The number of shorebirds observed from Standardized Surveys alone ranged from 50 to 250 during the WHA (Figure 5). The greatest numbers occurring in the month of July. Shorebirds preferred habitats on the airport with short grass and open space (for greater visibility) such as those found adjacent to the runways at YAK.

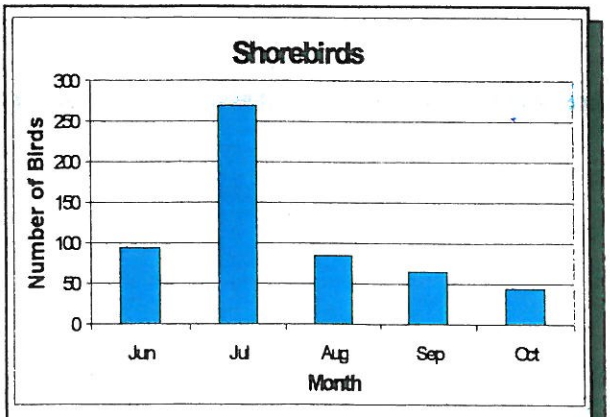

Figure 5. Total number of shorebirds observed at YAK during Standardized Surveys, June 1999 to October 1999.

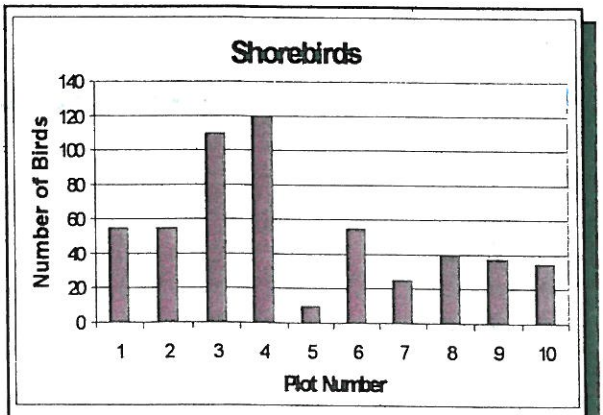

Figure 6. Total number of shorebirds observed at YAK by plot number from Standardized Surveys, June 1999 to October 1999.

Survey Plots 3 and 4 had the highest counts of shorebirds during the study (Figure 6). The semipalmated plover was observed 100% of the time loafing on (and perhaps nesting near) the runway during the Standardized Surveys, increasing the likelihood of the birds being struck by an aircraft. The common snipe was the second most common shorebird observed at YAK. Snipe generally stayed off the runway, but they still exhibited aerial mating displays that crossed the approach and departure airspace. Due to their large numbers, shorebirds are considered to be among the most hazardous wildlife groups at YAK.

Waterfowl

The waterfowl category of birds was made up of the following species: blue-winged teal, common goldeneye, common merganser, common murre, green-winged teal, mallard, northern pintail, red-breasted merganser, red necked grebe, ring-necked duck, trumpeter swan, white-fronted goose, and white-winged scoter. Waterfowl accounted for 9% of all wildlife observed on the airfield, during all Standardized Surveys. Waterfowl were most abundant in the month of July (Figure 7). Although waterfowl were not observed in the month of June during Standardized Surveys, General Observations indicated that they were present on the airfield, but in low abundance, during that time period. Mallards were the most frequently observed waterfowl species at YAK. Mallards preferred the area in Survey Plot 3 because of the ditch that held water and provided feeding and loafing habitat. Common goldeneye were also frequently observed at Survey Plots 3 and 9, due to the fact that these areas encompassed a pond. Survey Plots 3 and 9 had the greatest number of waterfowl (Figure 8).

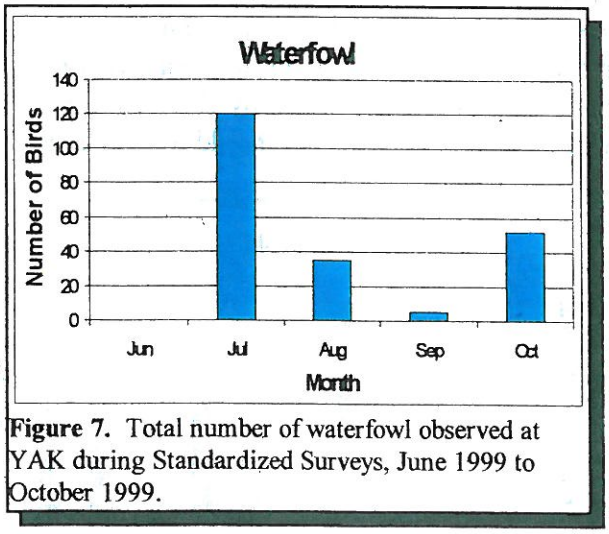

Figure 7. Total number of waterfowl observed at YAK during Standardized Surveys, June 1999 to October 1999.

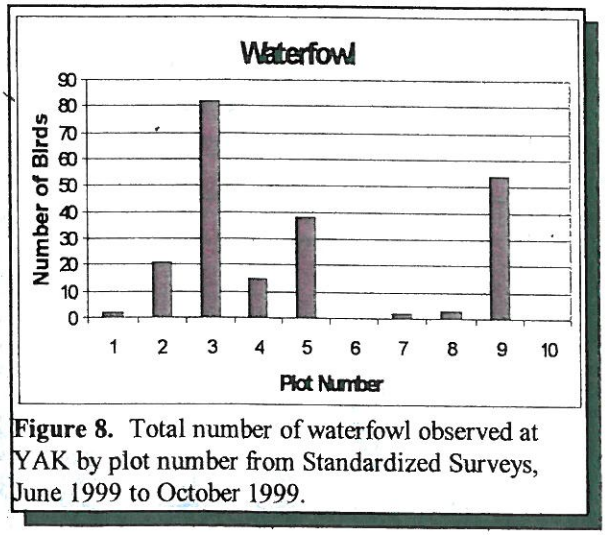

Figure 8. Total number of waterfowl observed at YAK by plot number from Standardized Surveys, June 1999 to October 1999.

Corvids

The common raven, Steller's jay, and black-billed magpie made up the group of birds known as the corvids. Corvids represented 6% of all wildlife species present throughout the Standardized Surveys at YAK. Corvid numbers were the highest in August (Figure 9) due to an influx of Steller's jays and

common ravens. Survey Plots 6 and 10 had the highest number of birds, which may be due in part to the woodlands near these Survey Plots (Figure 10).

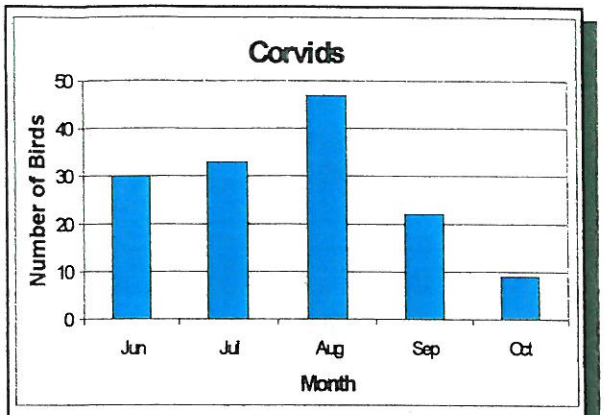

Figure 9. Total number of corvids observed at YAK during Standardized Surveys, June 1999 to October 1999.

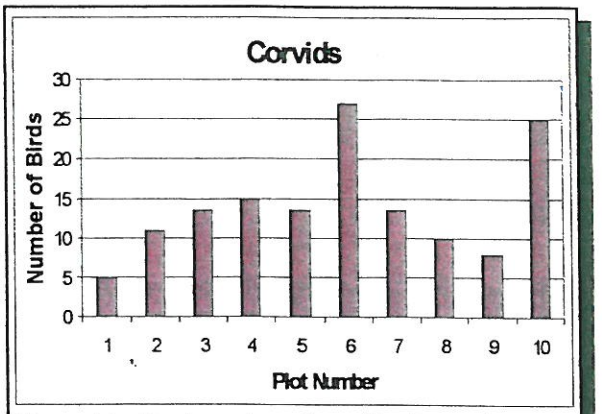

Figure 10. Total number of corvids observed at YAK by plot number from Standardized Surveys, June 1999 to October 1999.

6.1.2 Mammals

The group of wildlife referred to as mammals was made up of beaver, coyote, gray wolf, brown bear, marten, moose, and red squirrel. During the WHA, beaver dams had to be removed on a number of occasions by AKDOT&PF. The activity of beavers damming the ditch system and streams contributed to the flooding of the runways, which in turn increased waterfowl loafing in the area, creating an aircraft safety hazard. An aggressive beaver removal program was initiated by WS to reduce the damage associated by beavers at YAK. An ongoing beaver removal program should remain in place.

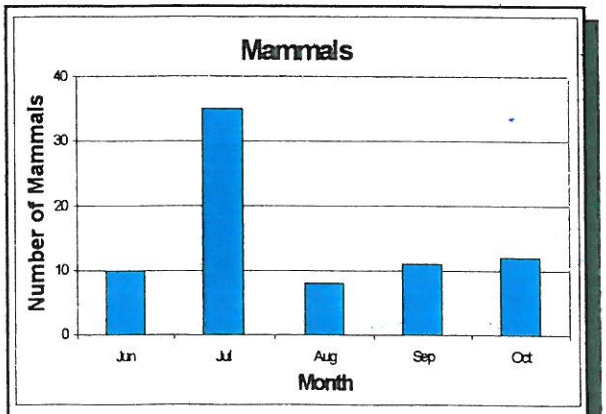

Figure 11. Total number of mammals observed at YAK during Standardized Surveys, June 1999 to October 1999.

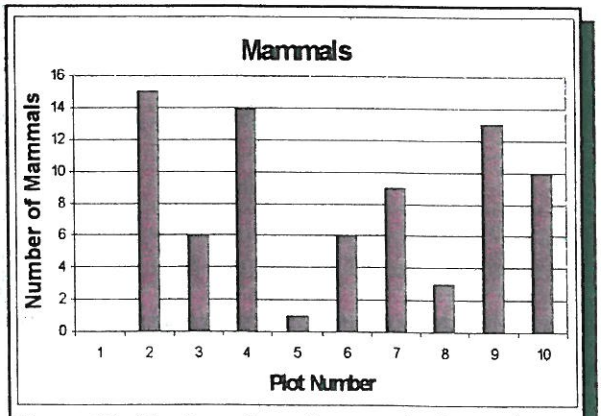

Figure 12. Total number of mammals observed at Yak by plot number from Standardized Surveys, June 1999 to October 1999.

Moose move freely across runways and taxiways due to the absence of a completed perimeter fence. The near miss that took place between a moose and a Cessna in September 1999, illustrates the need for a fence. Bear and coyotes have been observed running across the runways, as well. The need for a perimeter fence is illustrated in Figures 11 and 12, and is further addressed in **Section 7.3; Consider Construction of an Airport Perimeter Fence.**

6.2 Spotlight Surveys

The results of 10 Spotlight Surveys are presented in Table 3. While Spotlight Surveys are designed to detect the presence of nocturnal mammals, birds were seen more often. Fifty percent of surveys indicated the presence of mammals, while 100% of the surveys indicated the presence of birds. Owls were detected in two of the ten surveys. Owls are a cause for concern because of their size, nocturnal foraging characteristics, and damage associated when struck.

Table 3. Number of animals observed by month during Spotlight Surveys at YAK, August 1999-October 1999.

Month	*Species*	*Number of Animals*
August	Common Snipe	15
	Gray Wolf	1
	Mallard	26
September	Common Snipe	26
	Pectoral Sandpiper	2
	Savannah Sparrow	2
	Short-eared Owl	1
	Moose	1
	Snowshoe Hare	2
October	Canada Goose	1
	Common Snipe	4
October (cont.)	Great Blue Heron	2
	Brown Bear	2
	Northern Hawk Owl	1
	Snowshoe Hare	1

6.3 Runway Counts

Runway Count data was analyzed for the frequency of crossings by key species and their abundance in relation to specific areas of the runways. Bald eagles, common snipe, and Steller's jays were the most commonly seen species. This data is presented specifically for each runway. The presence of small passerine birds such as sparrows and swallows was noted in these surveys, but was excluded from the analysis because these surveys were designed to favor larger flocking birds, that are more hazardous to aircraft and are more visible to the observer at greater distances.

The results of the Runway Counts for both runways are presented in Table 4. These results` show that the greatest number of the crossings took place on the approach end of Runway 20 and at the midfield of the same runway. However, due to the relatively small number of birds observed during these surveys, results were interpreted cautiously. The proximity of the restaurant and other ground-side services may be a contributing factor in these crossings. Additionally, 36% of all crossings were made by waterfowl and shorebirds which indicates a need to eliminate the attractive features for these species.

Table 4. Occurrence of wildlife in each of the three surveyed zones of Runways 11/29 and 2/20.

Species	***Approach Runway 11***	***Approach Runway 29***	***Midfield Runway 11/29***	***Approach Runway 2***	***Approach Runway 20***	***Midfield Runway 2/20***	***Total***
American Robin					1		1
Bald Eagle	3	1	3	1	10	1	19
Belted Kingfisher					1		1
Barn Swallow					4		4
Black-billed Magpie	3						3
Common Golden-eye			4		1		5
Common Raven	1			4	1	1	7
Common Snipe						1	1
Coyote	1						1
Glaucous-winged Gull			1				1
Great Blue Heron			1				1
Mallard	3		1				4
Pectoral Sandpiper			1				1

Species	*Approach Runway 11*	*Approach Runway 29*	*Midfield Runway 11/29*	*Approach Runway 2*	*Approach Runway 20*	*Midfield Runway 2/20*	*Total*
Semi-palmated Plover	3	1		1	1	12	18
Steller's Jay				2	2	7	11
Unknown passerine	1						1
Unknown waterfowl				1		1	2
Total	15	2	11	9	21	23	81

These surveys reveal that the Runway 20 midfield and approach zones had similar patterns of bird crossings. In contrast, looking at the species specific data, some trends do appear. Crossing by bald eagles represented 24% of the total. This was the highest of any bird observed. The size and inability of eagles to avoid incoming aircraft make this bird especially hazardous.

6.4 Track and Scat Surveys

The results of the Track and Scat Surveys are presented in Table 5. There was a total of 108 crossings recorded in this survey conducted between the weeks of June 21 and September 7, 1999. The average number of crossings per week for all species recorded was about 10 (9.8). Bears and canids represented 76% of the crossings, with 46 (42.5%) and 35 (32%), respectively. Moose crossings represented 22% of the total crossings sampled, with 24 being recorded.

Table 5. Total number of crossings by species in each grid square of Runway 11/29 between the weeks of June 21, 1999 and September 7, 1999.

Species	*Grid B5*	*Grid C5*	*Grid D5*	*Grid E5*
Avian		2		
Bear	4	26	16	
Canid	9	20	7	6
Moose	2	4	12	

Please refer to Figure 1 for grid locations. Grid E5 (the approach end of Runway 11) had the lowest number of crossings (6), all of which were made by moose. Grid C5 (west of midfield) had the greatest number of crossings with 52. This grid contains the access road to the VOR site, which seems to be a very popular travel route for both bears and canids. The ease with which these animals can move from one side of the airfield to the other via this roadway is the most likely explanation for this area containing nearly half of all crossings surveyed. The presence of spawning salmon using the

diverted stream channel that crosses the VOR road may also be a contributing factor. These fish prove especially attractive to bears.

6.5 General Observations

General Observations provide useful data that may not otherwise have been collected during formal surveys. Many characteristics of the habitat on the airfield, as well as intermittent attractions to wildlife, are noted in these surveys.

Safety areas adjacent to runways and drainage ditches are frequently visited by both waterfowl and shorebirds. The presence of these birds dramatically increases when the damming activity of resident beavers raises the water level and floods the grass of these safety areas. Dabbling ducks such as the mallard and teal find this to be an enticing habitat. Groups of 20 or more ducks were observed feeding in this flooded grass.

During the WHA, the telephone poles and numerous antennae in the vicinity of the airfield were observed to be favorite perches for bald eagles, and to a lesser extent, ravens. Poles in the immediate vicinity of the ramp were observed to have bald eagles on them nearly every day. Eagles and ravens were occasionally observed feeding on rubbish and animal remains found near the facilities adjacent to the ramp area. The slow, soaring flight of eagles makes them a special wildlife hazard concern. In addition, according to the National Wildlife Strike Database, collisions between bald eagles and aircraft are more common in southeast Alaska, than in other parts of the country.

During the compilation of the WHA, concerns arose regarding a fish cleaning facility located near the ramp. Improperly discarded fish offal was reportedly being consumed by eagles and ravens at the facility. These birds frequently sit on nearby telephone poles and antennae, presumably awaiting more food. In addition to the fish cleaning facility near the ramp, there are two similar facilities adjacent to rental cabins across the street. All three facilities are reportedly under the same ownership. Airport personnel report that fish egg drying (on open racks, by the lodge's patrons) is a common practice. This practice provides another potential food-based attractant for wildlife. Airport personnel also report that occasionally, fishermen have been observed feeding eagles, during the fish cleaning process. WS personnel did not observe such activity during their visit. However, the serious nature of these alleged activities warrants further investigation.

YAK management should vigorously oppose any activity (including fish processing) that may attract potentially hazardous wildlife to the vicinity of the airport. Improperly-closed containers (for fish offal or other refuse) create an attractant for ambitious wildlife (Figure 13). Wildlife which are fed by humans will seek out other humans as a source for "hand-outs", often making themselves a nuisance and/or threat to human safety.

Large flocks of migrating birds are frequently present in the fall. While the study did not sample during the spring, it can be reasonably assumed that these flocks can be seen then as well. Sandhill cranes, trumpeter swans, Canada geese, and white-fronted geese were all observed passing over the airfield. Few individuals were observed landing on the airfield, indicating that the birds may not be specifically attracted to the airfield, but are merely passing over it on their migration route. Sandhill cranes are especially hazardous due to their habit of forming large flocks. Flocks of sandhill cranes were frequently observed circling over and around the airfield in an apparent attempt to gain altitude.

6.6 Off-Site Wildlife Attractants

The FAA has issued an Advisory Circular (AC 150/5200-33) regarding *Hazardous Wildlife Attractants On Or Near Airports* (Appendix 10). The advisory circular states that "caution should be exercised to ensure that land use practices on or near airports do not enhance the attractiveness of the area to hazardous wildlife." This circular identifies siting criteria for wildlife attractants. A distance of five miles is recommended if the attractant may cause hazardous wildlife movement into or across

Figure 13. Fish offal containers at the local lodge

the approach or departure airspace. Advisory Circular 150/5200-33 specifically identifies the underwater waste discharge of fish processing offal and putrescible waste disposal operations.

Monti Bay, adjacent to the city of Yakutat, supports two commercial seafood processing operations. Sitka Sound Seafood and YKI fisheries both discharge into Monti Bay. These operations are approximately 3.5 miles from the end of the closest runway. Large numbers of gulls, as well as cormorants and eagles, are attracted to the area by waste discharged from the processing activities. These birds are usually found scavenging on the surface of the water or loafing on the structures adjacent to the facilities. With the exception of bald eagles these birds were not seen flying at high altitudes (i.e., >1,000 feet above ground level [AGL]).

The municipal landfill operated by the city of Yakutat handles putrescible waste. This site is located approximately 3.25 miles from the threshold of Runway 11. Bald eagles, ravens, northwestern crows, and bears are present at this facility year round. Gulls occur at the landfill as well, especially during the late fall, and early spring when fish processing on Monti Bay is inactive or significantly reduced. Birds present at this facility, especially bald eagles, can pose a threat to ascending or descending aircraft. It is unlikely that the bears present at this facility wander very far from the site and are thus unlikely to cross the airport. State and local officials are reviewing the use of this facility due to environmental concerns. Future landfill development or modifications plans merit input by airport officials.

The Lost River (on the approach to Runway 29) and Tawah Creek (on the approach of Runway 29 and 2) both contain significant runs of spawning salmonid species. This activity leads to an increase in the presence of bald eagles, ravens, and bears in the vicinity of the airfield and runway approaches. These animals are feeding either on the fish themselves as they spawn and die, or on the remains left behind by sport-fishermen. During these salmon runs, some fish are present in the drainage on the airport where eagles and bears feed on them.

7.0 Recommendations

Recommendations for managing wildlife hazards at YAK are divided into three sections:

- **General**
- **Habitat Manipulation**
- **Exclusion, Repulsion, and Removal**

General recommendations refer to recommended policies and procedures for dealing with wildlife hazard management. Habitat manipulation will reduce the amount of food water, and cover available to hazardous species. Exclusion, repulsion, and removal techniques are used to deal with specific individuals or groups of animals.

7.1 General Recommendations

Develop a Wildlife Hazard Management Plan Based on the Wildlife Hazard Assessment

In addition to the Wildlife Hazard Assessment (WHA), the Federal Aviation Regulations (FAR) also mention another document referred to as a Wildlife Hazard Management Plan (WHMP) (FAR Part 139.337, sections c,d,e). According to this regulation, the Administrator determines if a WHMP is necessary for the airport under review. It is our opinion that a WHMP is a good idea for YAK or any airport that experiences potential wildlife hazards. Using this assessment as a basis, a well written WHMP can provide guidance on day to day wildlife hazard management activities and assist the airport manager in identifying potential wildlife hazards. FAR Part 139.337 (e) discusses the required content for such a plan. In addition, an outline for the WHMP is provided in Appendix 11. Due to the fact that airports are dynamic environments, the plan should be reviewed at least annually to determine if changes are necessary and to consider how the wildlife deterrent program can be improved or modified.

Designate a Wildlife Coordinator and Delineate Responsibilities of all Personnel Involved

The airport manager should designate a wildlife coordinator to respond to and monitor all wildlife related activities. It should be the responsibility of the coordinator to see that recommendations from the Wildlife Hazard Assessment are implemented and that a Wildlife Hazard Management Plan is developed. The coordinator should also be responsible for:

- obtaining the appropriate wildlife control permits and supplies.
- maintaining a database of wildlife hazard management activities, as well as wildlife strike information collected form pilot reports, mechanical inspections, and runway sweeps.
- making arrangements for the proper instruction of YAK personnel who are involved in the implementation of wildlife hazard management
- ensuring that YAK personnel and pilots are familiar with the proper procedures for reporting all types of wildlife strikes and making the FAA Form 5200-7 readily available.
- maintaining cooperative relationships with appropriate wildlife resource management agencies (e.g. USFWS, WS, ADF&G, and United States Forest Service [USFS]). Such relationships will provide the airport with ongoing biological expertise.

Adopt a Policy of Zero Tolerance Toward Wildlife

A policy of zero tolerance on the airfield should be adopted toward all potentially hazardous wildlife, particularly eagles, ravens, waterfowl, beavers, moose, and bear. All wildlife observed on the airport should be considered hazardous to aircraft, since any wildlife could cross over the runway. However, the species listed above have historically been found to be the most hazardous to aircraft because of their size, flocking characteristics, or other behavioral attributes.

Consider Using a Computer Database for Improving Record Keeping

To assist airports with the compilation and interpretation of wildlife hazing/control data, WS has developed the Wildlife Hazard Management Information System (WHMIS) database. The database files are free, but require a computer with Windows 95 or higher and Microsoft Access 97 to run. Once set up, the database system is user friendly and can be operated by personnel with little or no previous computer training. Employees can enter their own hazing data and quickly print out reports or analyze trends. If you have any questions or would like to request a copy of the database system contact the WS Alaska District at (907) 745-0871.

Issue Special NOTAMs During Times of Observed Bird Migrations

Flocks of migrating birds such as sandhill cranes and trumpeter swans do not use the airfield directly and therefore cannot be excluded from flying over it. A special Notice to Airmen (NOTAM) issued to the proper air traffic control authority (Juneau Radio) detailing the species presenting the hazards, flock size, direction of movement, and altitude, would give pilots a more detailed picture of the current wildlife hazards (e.g., flocks of up to 500 sandhill cranes moving southeast at an altitude of 1,500 feet). These observed peaks in bird migration usually last only several days and in some instances may only occur at certain times of the day. The NOTAM should be issued upon observation of these large flocks and canceled after the hazardous activity has ceased. A NOTAM can also be issued if birds are expected in an area such as during the spring and fall migratory periods. The issuance of a special NOTAM concerning these flocks would serve as a supplement to the NOTAM of "large birds in the vicinity of the airport" (as referred to in the Airport/Facility Directory). These special NOTAMs would give pilots a more detailed understanding of the specific nature of the wildlife hazard.

During the course of this WHA, peaks in bird migration were noted. These time periods are likely to be specific to the Yakutat area, but may fluctuate from year to year due to environmental influences on the migration of birds. Regional fluctuations in weather patterns affect the timing of bird migrations and may affect the peak periods listed in the WHA. The spring and fall migrations are typically marked by a peak of activity in May and September respectively. Large flocks of shorebirds and waterfowl can be expected for several weeks during each of these months, but the exact times may vary from year to year.

Participate in the Public Process for Land Use Projects in the Vicinity of the Airport

Airport management should participate in the public planning process for land use projects (e.g., proposed landfills, wildlife habitat enhancement) within a five-mile radius of the airport. Many land use practices, including landfills and sewage treatment facilities, can serve as an attractant to large flocks of hazardous bird species. Caution should be exercised to ensure that land use practices (on or near the airport) do not enhance the attractiveness of the area to hazardous wildlife.

YAK should oppose any wildlife attracting land uses that: 1) are within five statute miles of the airfield; and 2) may cause hazardous wildlife movement into or across the approach or departure airspace of the airport. Participation in the planning process can help airport managers educate local landowners about practices that may adversely affect aircraft safety. Airport management should also participate in the design phase of new projects on the airfield to ensure that they do not create an attractant for wildlife (i.e., create more standing water, provide nesting space for swallows).

YAK management should vigorously oppose any activity (including fish processing) that may attract potentially hazardous wildlife to the vicinity of the airport. When such activities are observed, airport management should attempt to meet with the offending party and discuss possible alternatives to the potentially hazardous activities.

7.2 Habitat Manipulation

Eliminate Standing Water as Much as Possible

Standing water can serve as an attractant to both resident and migrating waterfowl on the airfield. Reduction of this standing water can reduce the number of waterfowl present on the airfield. Stagnant pools of water can provide a breeding ground for mosquitoes and other insects that in turn attract birds, such as swallows. Damming by beavers impedes the drainage of water, increasing the amount of standing water which in turn attracts waterfowl. Reduced drainage can also lead to other problems such as flooding the runway and lights, as well as the creation of snags in woodland areas that are flooded for extended periods. These snags can serve as potential nesting and/or loafing sites for birds such as eagles. It will be necessary to institute a sustained beaver control program to insure that further damming of drainage ditches and culverts is adverted.

Ditches, along the approach lighting on Runway 11, appear to have been created for a roadway that was once in use there. These ditches are usually void of water except during periods of heavy rain. The uneven footing and the depth of the ditches makes them difficult to mow, consequently, some brushy vegetation is starting to become established. The temporary standing water and flooded vegetation in these ditches are very attractive to waterfowl, as well as shorebirds. These drainages are probably no longer necessary due to the limited use of this roadway. Their immediate proximity to the approach corridor for Runway 11 makes filling a consideration. The piping, filling, and grading of unused drainage ditches has also been proposed in the airport master plan (under FAR 139.307). The material dredged in the construction of these ditches appears to have been piled immediately to one side of the ditch, which could be used to backfill, and would greatly facilitate the filling of the ditches. When selecting final-grade material for these back-filled areas, a rocky or gravelly substrate (absent of vegetation) would be the least attractive to wildlife. If vegetation must be planted over the filled areas, a woody vegetation is preferred to discourage waterfowl use. However, woody vegetation may attract moose in the absence of a fence. If turf is used, it should be maintained at a height of 6-10 inches to discourage geese. If drainage is still a concern, the installation of 6 to 8-inch

perforated drainage tile could be performed prior to filling the ditch. Installation of tile connected to the existing drainage ditch on the Colorado Road should address any concerns about future drainage.

Installation of drainage tile is also merited in the low drainage ditches between the ramp area and the approach end of Runway 11. Standing water is almost always present and the level varies with the amount of rainfall. Occasionally, the level rises over the ditch and floods into the grass. When flooding occurs, the area is frequently used by migrating shorebirds, ducks, and geese for feeding and loafing. The standing water also attracts large numbers of insects, which in turn attract flocks of barn swallows. The close proximity of this flooded area to the approach end of Runway 11, Taxiway "A", and the ramp increases the potential for wildlife hazards to aircraft.

Eliminate Nesting Cover Along Water Edges

The presence of brushy cover along the edges of water sources provides nesting habitat for waterfowl. Willows are becoming established in most of the runway drainage. If the growth of this vegetation continues, it could lead to increased use by waterfowl, as well as provide habitat for beavers and moose. It is recommended that shrubs (especially those within 10 feet) along waterways be cut, and the woody debris removed. Any grass growing within 10 feet of water should be cut to a height of 7-14 inches.

Currently, the drainages along the runways at YAK are cataloged as anadromous fish habitat by the ADF&G, and are subject to special management restrictions. The removal of existing trees and brush along water courses is currently prohibited for protection of fish habitat. Exemptions are sometimes granted do to the nature of wildlife hazards to aviation. Dense vegetation over existing ditches may be hampering the ability of the drainage system to handle the frequent storm-waters. This dense cover also provides habitat for beaver. Airport management should coordinate any drainage manipulation plans with ADF&G.

The removal of this vegetation along drainage areas will not only serve to reduce nesting cover on the airport, but will also reduce the attractiveness of the airport to beaver colonies and improve the overall flow of storm-water.

Install Weirs to Block Access to Airport Drainage by Adult Anadromous Fish

The installation of weirs on the drainage ditches adjacent to the runways at YAK is proposed in order to reduce the presence of feeding eagles, gulls, and bears. Weirs had been used to block the passage of adult salmon, while allowing young salmon to pass through to use the ditches for cover and protection. Currently the weirs have fallen into disuse and adult salmon are spawning in the ditches. Eagles and gulls have been observed feeding on fish taken from the ditches in the short grass adjacent to Runway 11/29. This creates a significant concern for bird strikes.

The renewed installation of weirs to prevent the future infiltration by adult salmon is recommended. The placement of these weirs should be sufficiently downstream to keep the fish and associated wildlife away from the approaches of the runways. Placement of these weirs may create an initial "stacking effect" on incoming salmon. Wildlife may concentrate around these areas also making placement a critical consideration.

The installation of weirs has been included in the airport's master plan. Consultation with the ADF&G will be necessary as with the recommendation to remove vegetation. The installation of weirs may facilitate the removal of vegetation in the ditches, due to the absence of breeding anadromous fish species.

Remove Snags and Trees with Broken Tops

Remove snags (dead and decaying trees) and live trees with broken tops in all areas within 2,000 feet of the runways. These snags and trees are used by bald eagles and other large raptors as perching sites and may serve as potential nesting sites. Eagle nests within 2,000 feet of runways can pose a significant safety hazard. **It is illegal to remove existing or historic bald eagle nests.** If an existing eagle nest is deemed a safety hazard, or if eagles begin to construct a new nest within 2,000 feet of a runway, contact the USFWS and ADF&G for guidance. See Appendix 7 for a directory of wildlife agencies.

7.3 Exclusion, Repulsion, and Removal

Develop and Maintain an Aggressive Beaver Removal Program

The importance of an aggressive beaver removal program can not be over emphasized. A removal program (with the objective of eliminating the resident population of beavers) will help to reduce the amount of standing water that is attractive to waterfowl and other birds. A reduction in standing water may also decrease the amount of time and effort needed to control wildlife attracted to standing water. When feasible, lodges and dams should be destroyed to prevent new individuals from taking up residence.

Allowing sport trapping on airport property can help to discourage future influxes of beavers. It should be noted that sport trapping alone may not maintain the beaver populations at a manageable level. The use of shooting and year-round trapping by airport personnel may be required to remove individuals found near the runways. Proper permits from ADF&G will be required for both the removal of beaver and their dams.

Remain Vigilant in Keeping Rubbish and Carcasses Controlled Near the Airfield

With the presence of both food and lodging facilities adjacent to the airfield, it is important that airport management continue to ensure that rubbish is picked up and contained in properly closed containers.

Whenever possible, people should be educated as to the hazard posed to aircraft by scavenging wildlife. Bald eagles and ravens are common species that are attracted to food sources (e.g., dumpsters) around buildings. It is also important to consider that people enjoy leaving scraps out to attract wildlife for viewing purposes. Posting signs and/or material explaining the reasons not to feed wildlife may help to educate the public. However, the transient nature of clientele passing through lodging facilities makes the issue of discouraging feeding a difficult one. People staying for relatively short periods of time may not share the concern that their activity can contribute to a safety hazard. Airport management should work with the management at the local food service and/or lodging facilities in order to address the issue of safety caused by increased attractants to wildlife. The movement of such activities further from the ramp, perhaps to where the fishermen debark from the fishing vessels, or the implementation of more conscientious sanitation standards are a few possible options.

During times of high water near the airfield, the occurrence of road kill and salmon in safety areas may also attract scavenging wildlife. These carcasses and rubbish should be removed. A reduction in this food source for scavengers will help reduce the activity of ravens and eagles next to runways.

Expand Hazing of Wildlife to Include All Hours of Operation

All hazardous wildlife should be hazed away from the airfield whenever observed. Such efforts help to reinforce the "zero-tolerance" zone and policy towards wildlife. Birds can become acclimated to infrequent hazing, thus becoming more difficult to keep away. Hazing should include all wildlife in the immediate area of all airport property. The flight capability of flocks of birds enables them to readily travel into aircraft operating areas in a short period of time.

Use Multiple Types of Pyrotechnic Devices in Hazing Activities

Birds can quickly become acclimated to a particular type of stimulus and should be hazed with multiple types of pyrotechnics. Screamers, bangers, and cracker-shells should all be kept on hand, and used in rotation during wildlife control operations. When deemed necessary, persistent birds may be taken by shooting. Shooting should be reinforced with non-lethal pyrotechnics so the other birds will associate the pyrotechnics with an actual danger. The proper depredation permits from ADF&G and USFWS must be secured before implementing lethal control.

Exclude Swallows from Nesting in Aircraft Hangars and Under Eaves

Swallows should not be allowed to nest in aircraft hangars and under the eaves of buildings. An individual swallow does not pose a substantial damage potential to aircraft, but flocks of swallows do. The presence of these nesting birds on the airport poses a risk to aircraft safety. The large city owned hangar currently has over twenty barn swallow nests in the hangar door tracks. These nests are located in the far ends of the tracks, where the last two door panels are not fully opened. Broken panes of glass in the large windows of the hangar also give free access to the rafters of the building