WILDLIFE HAZARD ASSESSMENT
for the
SITKA ROCKY GUTIERREZ AIRPORT (SIT)
SITKA, ALASKA
(March 1998 through April 1999)

Submitted by:

United States Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services
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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
AFD	Airport Facility Directory
AGL	Above Ground Level
AKDOT&PF	Alaska Department of Transportation and Public Facilities
AOA	Air Operating Area
BASH	Bird Aircraft Strike Hazard (a designation commonly used by the U.S. Military)
CFR	Codes of Federal Regulation
DOT	Department of Transportation
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FIFRA	Federal Insecticide, Fungicide, Rodenticide Act
FOD	Foreign Object Debris/Damage
ICAO	International Civil Aviation Organization
ILS	Instrument Landing Systems
LDA	Localizer Displaced Array
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
NOTAM	Notice to Airmen
NWRC	National Wildlife Research Center
SE	Standard Error
SIDA	Security Identification Display Area
SIT	Sitka Rocky Gutierrez Airport
T&E	Threatened and Endangered Species
USFS	United States Forest Service
USFWS	U.S. Department of Interior, Fish and Wildlife Service
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])

1.0 Introduction

In October 1997, three air carrier aircraft experienced damaging collisions with birds at the Sitka Rocky Gutierrez Airport (SIT), Sitka, Alaska. All three strikes involved unidentified gull species (*Larus spp.*) which were ingested into at least one engine. One strike resulted in an engine shutdown. These strikes involved Boeing 737 passenger jet aircraft, and an immediate precautionary landing was executed in each instance. Other aircraft have experienced wildlife strikes with gulls and other bird species at SIT in recent years. However, the wildlife strikes which occurred in October 1997 were the most damaging in recent memory. An estimated $180,000 in damage costs, which includes the cost of engine repair, lost revenue, customer reimbursement, and aircraft time out of service, was accrued from the wildlife strikes at Sitka. Fortunately no injuries resulted from these strikes but the potential for catastrophe is underscored by these examples.

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, 1999; Robinson 1997), and can erode public confidence in the air transport industry as a whole (Conover et al. 1995). In several instances, wildlife-aircraft collisions in the United States have resulted in human fatalities. The most recent occurred in 1995 when an Air Force E-3B AWACS aircraft collided with a flock of Canada geese on Elmendorf Air Force Base, Alaska. The accident killed all 24 passengers and crew (Gresh 1996, Ohashi et. al. 1996). This is an extreme example and most wildlife strikes do not result in fatalities. However, 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 FAR Part 139.337 (Appendix 1), the FAA requires certified airports to conduct an ecological study/wildlife hazard assessment (WHA), and if necessary, establish a wildlife hazard management plan (WHMP) when any of the following events occur on or near an airport:

(1) An air carrier aircraft experiences 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. These are determined by the time of year, the species involved and their attraction to the airfield, habitat characteristics on and around the airfield, and a host of other variables. It is necessary to have a comprehensive understanding of a particular animal's biology and its relationship to specific environmental characteristics before initiating a wildlife control program. A wildlife hazard assessment provides

the foundation from which one develops a more complete and site-specific understanding of potential wildlife hazards on an airport.

These studies (WHAs) often take up to one year to complete. This is because wildlife populations, especially migratory birds, exhibit seasonal fluctuations in behavior and abundance. Upon completion of the study, recommendations which are designed to reduce wildlife hazards are developed. These recommendations are based on an analysis of the data collected. If it is determined from the assessment that significant wildlife hazards are present, the FAA will often require that a WHMP be written. Such a plan addresses the responsibilities, policies, and procedures necessary to reduce wildlife hazards. The WHMPs are written in accordance with CFR 14, 139.337, subpart (c), (d), and (e), and are the responsibilities of the airport.

1.1 Legal Authority of Wildlife Services (WS)

The U.S. Department of Agriculture, Wildlife Services (WS) program has a Memorandum of Understanding (MOU) with the FAA which establishes a cooperative relationship between FAA and WS for resolving wildlife hazards to aviation that benefits public safety (Appendix 2). 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 wildlife hazard assessment to serve as a basis for the wildlife hazard management plan, but the responsibility of development, approval, and implementation of the wildlife hazard management plan still lies with the airport manager.

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

The MOU and legislation allows WS to conduct initial on-site investigations, biological assessments (short-term studies), wildlife hazard assessments (ecological studies), wildlife management operations, and to assist airports with the development of a wildlife hazard management plan.

Due to the unique hazards presented by resident wildlife and the history of wildlife hazards at SIT, the Alaska Department of Transportation and Public Facilities (AKDOT&PF) entered into an agreement on December 8, 1997 with WS to conduct a Wildlife Hazard Assessment for SIT. The WHA was conducted from March 12, 1998 to April 16, 1999 per agreement number 98-73-02-5286-RA. During the course of the assessment, responsibility for managing airport wildlife hazards remained with the airport manager.

2.0 Objectives

The objectives of the Wildlife Hazard Assessment 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 SIT and surrounding areas that may contribute to wildlife hazards on the airfield.
4. Provide management recommendations for reducing wildlife hazards at SIT which serve as a framework in the development of a Wildlife Hazard Management Plan.

3.0 Background

3.1 Study Site at Sitka Rocky Gutierrez Airport (SIT)

SIT is located one mile southwest of the City and Borough of Sitka on Japonski Island, which lies on the west coast of Baranof Island in southeast Alaska. Baranof Island is part of the Alexander Archipelago and the city of Sitka is the only community in southeast Alaska fronted by the Pacific Ocean (AK Dept. Commerce & Economic Development 1989). To the north and east of SIT lies the coastal mountain range of Baranof Island. SIT is surrounded to the west and south by the Sitka Sound and Pacific Ocean. To the west and south are numerous small rocky islands as well as the larger Kruzof Island with the dormant Mt. Edgecumbe volcano. The waters immediately surrounding the airport provide a rich marine ecosystem with a large diversity and abundance of marine life. Local spawns of herring, smelt, and salmon attract thousands of gulls (*Larus spp.*) and other species that breed in the area or are year-round residents. Bald eagles (*Haliaeetus leucocephalus*), common ravens (*Corvus corax*), and Northwestern crows (*Corvus caurinus*) are some of the birds more frequently observed at the airport.

SIT property totals about 2,000 acres, only 100 of which are used for aircraft operations. SIT is owned by the State of Alaska and operated by the AKDOT&PF. The airport lies at an elevation of approximately 21 feet above mean sea level (AKDOT&PF 1998).. SIT is located at 57° 02.9' N latitude, 135° 21.6' W longitude. Summer temperatures average approximately 55°F and average winter temperatures are approximately 35°F (SEDA 1998). During the course of the assessment, the airfield was covered with snow for a three week period from late January through early February.

The airport serves as one of two main ports of transportation for the city of Sitka because the city is not connected to the Alaska highway system. The runway system is comprised of one paved

Runway (11/29) 6,500 feet long by 150 feet wide. Air carrier operations consist of Boeing 737-200, 737-400, and occasionally MD-80 aircraft. The major air carrier serves the city of Sitka with approximately four daily flights in the winter and six daily flights in the summer. One daily DC-9 cargo flight also operates on the airport. Numerous transient aircraft including executive jets, Beech, Navajo, Cessna, and Piper planes use the airport on a daily basis. The United States Coast Guard maintains an Air Station which houses two Jayhawk helicopters and serves as a support station for transient military aircraft, particularly C-130's. Coast Guard helicopter activity is frequent throughout the year.

3.2 Habitat Description

Vegetation

SIT lies on a small island dominated by stands of Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*), which is part of the much larger temperate rainforest ecosystem. The airport itself is mostly developed land comprised of paved surfaces and a few buildings. The causeway islands to the south of the runway at SIT are small spruce/hemlock islands with extensive rocky shorelines and varying amounts of intertidal areas. The majority of vegetation at SIT can be considered typical of disturbed sites in southeast Alaska. At SIT this disturbed site vegetation can be divided into shrub and grass areas. Shrub areas are characterized by Sitka alder (*Alnus crispa*) and sapling sized black cottonwood (*Populus trichocarpa*); both growing to a height of 1 - 6 feet tall. A sparse mixture of salmonberry (*Rubus spectabilis*) and other woody plants can also be found in these shrub areas. Grassy disturbed sites are comprised mainly of pioneering grass species. These grassy areas are usually mowed at least once a year by airfield maintenance. The presence of rodents was not detected in any of the grassy sites at SIT.

Water

The only sources of fresh water at SIT are the puddles of temporary standing water that form in grassy areas during and after periods of rainfall.

Marine

The adjacent marine waters of Sitka Sound provide an abundant and diverse source of food and cover for wildlife at SIT. The most productive of the marine habitats at SIT is the rocky shoreline and associated intertidal zone. The rocky shorelines at SIT can be classified as exposed shoreline (O'Clair and O'Clair 1998) dominated by various seaweeds, kelp, barnacles, limpets, chitons, mussels, anemones, sea stars, and several species of crustaceans. Kelp beds are numerous in the waters immediately adjacent to Runway 29/11. Kelp beds provide cover for small fish such as Pacific herring which use these areas and the rocky shoreline for spawning. Numerous bird species feed on the fish and invertebrates common in the intertidal zone and adjacent waters.

3.3 History of Wildlife Hazards at SIT

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 in part, are found on any airside pavement area or within 60 m (200 feet) of a runway, unless another reason for the bird or mammal's death is identified.

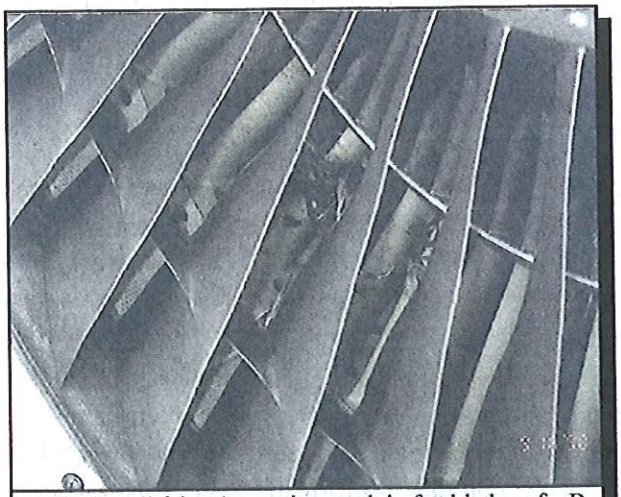
The definition of a near miss used in this assessment is defined as: *An incident in which either the aircraft or animal takes evasive action to avoid a collision.*

A look at the history of wildlife hazards at SIT reveals several incidents of damaging wildlife strikes. Most notable of which was a series of four strikes in October 1997 totaling an estimated $180,000. As discussed previously, three of these strikes involved gulls. Gulls were the most abundant species on a year-round basis observed during the assessment. Bald eagles also pose a significant risk to aircraft safety as evidenced by a strike in July 1995 to a DC-9 during landing roll on Runway 29. Two eagles were killed in this incident, with no damage sustained by the aircraft. Other bird strikes have occurred over the years, mostly during the months of August, September, and October. This period coincides with the annual fall migration of shorebirds, waterfowl, and other species along the coastal areas of southeast Alaska. Table 1 lists all wildlife strikes occurring either at SIT or en route to SIT. This information was gathered from wildlife strike reports filed with the FAA and from observations made during the course of the assessment.

Table 1. Wildlife strikes occurring at or en route to SIT from 1990 - March 16, 1999.

Date	Type of Aircraft	Number/Species	Damage Costs	Comments
8/5/90	Boeing 727-100	2-10 sparrows	Unknown	Reported as sparrows but may have been sandpipers.
8/7/90	DHC8 Dash 8	Unknown	Unknown	Occurred at altitude of 50 feet on approach.
8/10/92	Citation V	Unknown	Unknown	No damage reported. Plane was taking off on Rwy 11
9/7/94	Boeing 737-400	Unknown	None	Occurred at altitude of 1,200 feet on approach 29

Date	Type of Aircraft	Number/Species	Damage Costs	Comments
9/21/94	Boeing 737-400	Unknown	Unknown	Although no costs shown, damage was severe.
10/19/94	PA-31-350	1 gull	None	Strike occurred on landing roll. No damage.
11/6/94	Boeing 737-200	1 gull	Unknown	Damage was reported as minor.
7/14/95	DC-9	2 bald eagles	None	Strike occurred on landing roll.
8/10/95	Boeing 737-400	1 gull	None	Occurred at altitude of 250 feet on approach.
10/17/97	Boeing 737	2 gulls	$1,000	Ingestions into both engines. Struck flock of 20-30 gulls that were crossing runway.
10/18/97	Boeing 737-400	2-10 gulls	$60,000	Resulted in precautionary landing.
10/20/97	Boeing 737-400	1 gull	$20,000	Resulted in engine shutdown.
10/20/97	Boeing 737-400	Canada goose	$100,000	Engine ingestion en route to SIT. Damage to engine.
5/6/98	Unknown	1 dunlin	Unknown	Probably struck by B-737 or DC-9.
8/14/98	British Aerospace Jetstream Super 31	1 western sandpiper	None	Struck during take-off. No damage reported.
8/24/98	Unknown	2 western sandpiper	Unknown	Probably hit by 737 during take-off or landing roll.
8/27/98	Boeing 737-200	1 Pacific golden plover	$98	No damage was found.
8/28/98	Boeing 737-400	1 western sandpiper	None	Struck during landing roll.
8/29/98	Boeing 737-400	1 short-billed dowitcher	$98	Struck fuselage below windshield. No damage.
9/3/98	Boeing 737-400	4 western sandpiper	Unknown	Strike occurred during take-off run.
9/13/98	Boeing 737-200	1 western sandpiper	$130	Struck windshield. No damage found.
9/16/98	Boeing 737-400	1 merlin	$130	Ingested into Engine 2 on landing roll. No damage.
9/18/98	Unknown	1 golden-crowned sparrow	Unknown	Bird remains found on runway. No other info.



Merlin (small falcon) remains stuck in fan blades of a B-737 following a strike at SIT on 9/16/1998.

Merlin (small falcon) remains found on runway following a collision with a B-737 at SIT on 9/16/1998.

When known, the damage costs reflect the estimated costs of repair, replacements, inspections, loss of revenue, fuel, and hotels. The four incidents in 1998 with damage costs shown reflect only the cost of inspections performed after the strike. The actual loss of revenue for the airline due to down time may increase this cost. Birds that were found dead on the runway, but not reported as having been struck by an aircraft, were still reported as wildlife strikes, as described in the definition of a wildlife strike presented earlier.

The frequency of wildlife strikes in 1998 stands in stark contrast against the relatively low frequency of reported incidents from 1990 to 1997. Given the recorded strike frequency of 1998, and the known history of wildlife abundance in the area, it is unlikely that the previous frequency of reported strikes reflects the actual number of strikes that occurred. This disparity is more likely attributed to the level of reporting during the two time periods. Table 1 illustrates the important role played by wildlife incident reporting as wildlife hazards are assessed, and how a lack of reporting could conceivably lull airport management (and others) into a false sense of security. It is estimated that between 20-25% of all strikes nationwide are reported to the FAA (Linnell 1996, 1999; Cleary et al. 1997), leaving an estimated 80% of wildlife strikes unreported. All wildlife strikes reported during the WHA were filed with the FAA using FAA Form 5200-7 (Bird/Other Wildlife Strike Report). A copy of this form is provided in Appendix 3.

Nine near misses were recorded during the assessment. Five of the near misses involved gulls, two involved eagles, one involved sparrows, and one involved a river otter (*Lutra canadensis*). Most of the near misses involving gulls occurred at low altitude during takeoff. One of the near misses involved a 737 on approach to Runway 11 which just missed a flock of 15 bald eagles circling over the ocean at an altitude of 400 feet. Another near miss involved a river otter that ran across the runway towards the tidal lagoon (adjacent to Airport Road) just narrowly missing the landing gear of a DC-9 which was back-taxiing towards the parking ramp. These near misses illustrate the potential for wildlife strikes beyond those inferred from a review of the strike record. The near miss

with the river otter also demonstrates the need to include mammals in the list of hazardous species targeted by a wildlife hazard management plan.

3.4 SIT Wildlife Hazard Management Review

SIT currently has a wildlife hazard management program in place. This program includes the active deterrence and/or removal of hazardous wildlife on the runway prior to air carrier arrivals and departures. Most of the active wildlife deterrence occurs within 1 hour of an air carrier operation. A brief WHMP is included in the airport's certification manual and gives instructions regarding times of operation, methods, and data recording, but needs further development. A copy of this plan is provided in Appendix 4. The existing plan does not identify any habitat management objectives, species specific management techniques, or hazardous locations on the airport. The current WHMP places greatest emphasis on gulls, eagles, crows, and ravens but does not identify other potentially hazardous species such as waterfowl or shorebirds. A recommendation for improving the current WHMP is included in the Recommendations section of this assessment. During the assessment, the airport maintained permits from the USFWS and the ADF&G for the hazing and taking of gulls, ravens, crows, and mallards (*Anas platyrhynchos*). The airport was also permitted to haze bald eagles. A copy of each permit is provided in Appendix 5.

The airport has kept good written records for the past several years. These records summarize the number of birds hazed and taken by month. These reports are based on daily "shotgun patrols" of the runway. A "shotgun patrol" is a sweep of the runway prior to an air carrier arrival or departure for the purpose of identifying and alleviating wildlife hazards. One column of the Sitka Airport Annual Bird Report (Appendix 6) shows the "estimated number of birds on runway" by month. The title of this column may be more accurately represented as the number of birds hazed, not necessarily observed, because the same birds may have been hazed multiple times. For this reason, caution should be exercised when using the numbers on the annual bird report to interpret wildlife activity. Furthermore, these numbers are influenced by the availability of personnel to conduct wildlife control operations, the perception of some species as less hazardous, and the variation in hazing efforts by individual personnel. A more accurate representation of wildlife activity is obtained by conducting systematic wildlife surveys independent of wildlife control operations.

In an effort to analyze airport management's wildlife control efforts, airport employees were asked to complete daily records of their wildlife control activities (Appendix 7). This information was used to determine the types and efficacy of various control techniques currently used. The wildlife control data was also used to determine the amount of focus being placed on individual species and particular locations on the airport. All wildlife that were taken by lethal means and recovered by airport personnel were then given to WS personnel for accurate species identification and disposal. Ravens and crows were dissected and their crop/gizzard contents analyzed to determine food habits. The results of these crop/gizzard analyses are presented in the Results/Discussion section.

The most commonly used methods to control hazardous wildlife at SIT are pyrotechnics, vehicle hazing, and shooting (lethal control). Pyrotechnics use includes 12-gauge crackershells and 15-mm whistlers. Vehicle hazing involves the use of lights, sirens, and the vehicle itself to deter wildlife

from an area. Shooting involves either the use of a 12-gauge shotgun with live ammunition or a pellet rifle to remove individual animals. Propane cannons were used on several occasions to deter gulls from returning to roost on the runway.

There were several species of birds that were hazed more frequently than others. Figure 1 indicates the percentage of the wildlife control efforts (combines all control methods) directed at a given species. A control effort is defined as the attempt to control one individual at a specific point in time. The chart shows that gulls, eagles, crows, and ravens were targeted the most. Other species of wildlife were also the target of control efforts but comprised less than 1% of the total number recorded. Gulls received by far the most control efforts. Gulls were also the most abundant and frequently seen species during the assessment (see Figure 6).

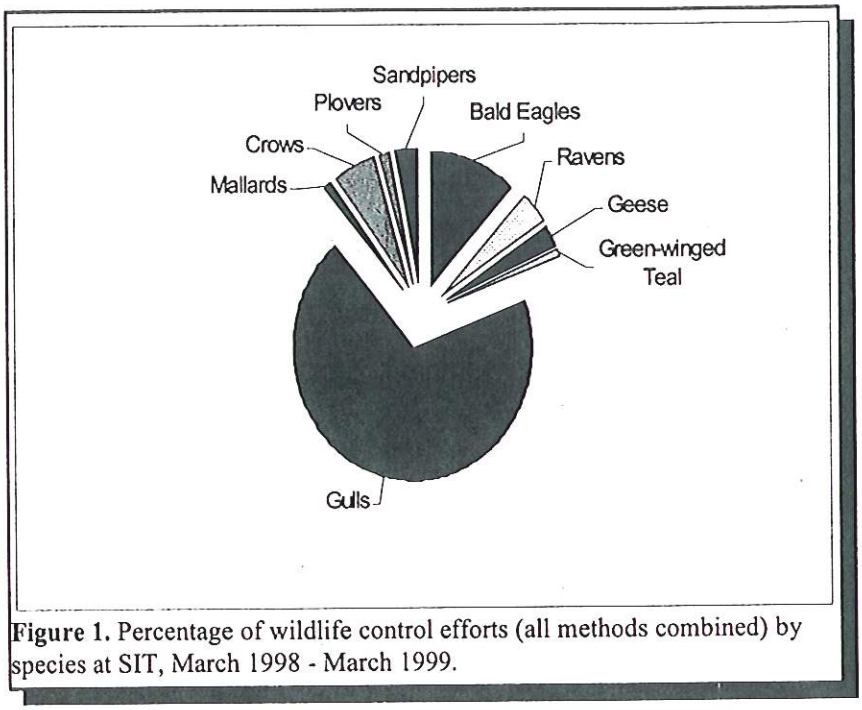


Figure 1. Percentage of wildlife control efforts (all methods combined) by species at SIT, March 1998 - March 1999.

Pyrotechnics, including crackershells, screamers (whistlers), and bangers were used in 65% of all control efforts. Crackershells were used solely in 31% of control actions while whistlers were used solely in 11% of control actions. The remaining 23% of control efforts which involved pyrotechnics were comprised of multiple methods including shooting and/or vehicle hazing. The integration of multiple methods to deter wildlife often has the greatest efficacy in reducing wildlife hazards. Vehicle hazing was used solely in 18% of control efforts and shooting was used solely in 10% of control efforts. For large flocks of birds, lethal shooting is most effective when used in conjunction with pyrotechnics. When used together, birds associate the sound of non-lethal pyrotechnics with the lethal action of a few live rounds of ammunition, thereby, increasing the efficacy of both methods.

A comparison of the number of birds destroyed as reported in the Sitka Airport Annual Bird Report 1998 (Appendix 6) and the number of birds received for wildlife disposal by WS personnel was made. A disparity was noticed between the number of birds received and the reported number of birds destroyed. Of the 528 birds reported destroyed from March 1998 to March 1999, only 122 were received by WS personnel for identification and disposal. The majority of these birds were gulls, ravens, and crows. This disparity is likely due to the inability of personnel to retrieve birds shot over water and/or the armor rock. While this is understandable, it is preferable to take only

birds that can be easily retrieved. On numerous occasions these unretrieved bird carcasses were immediately scavenged upon by eagles, ravens, gulls, and/or mink (*Mustela vision*). The presence of the scavengers themselves in the runway environment constitutes an additional hazard to aircraft safety. Because most of the wildlife control efforts occur shortly before an air carrier operation, it is undesirable to create any further food attractant for scavenging wildlife.

Gull, eagle, raven, and crow control efforts were also summarized by the location of the activity on the airport. A grid map which was used by airport personnel and during the course of the assessment is provided in Appendix 8. The following figures show the total number of control efforts by grid coordinate for gulls, eagles, ravens, and crows. Figures 2 - 5 show that most of the control efforts were concentrated in grid D12 which corresponds with the approach end of Runway 29.

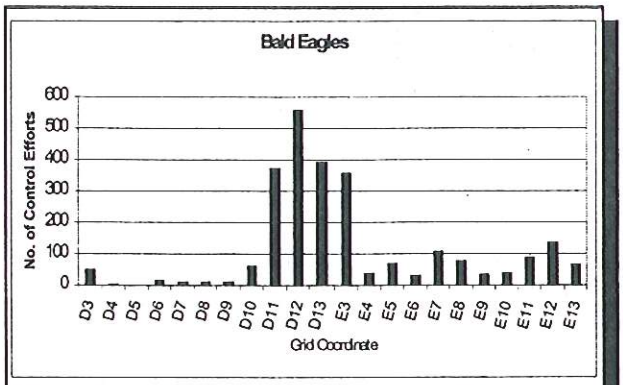


Figure 2. Number of bald eagle control efforts by location at SIT, March 1998 - March 1999.

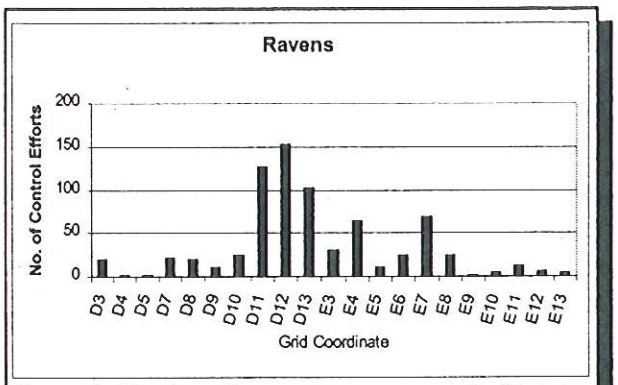


Figure 3. Number of common raven control efforts by location at SIT, March 1998 - March 1999.

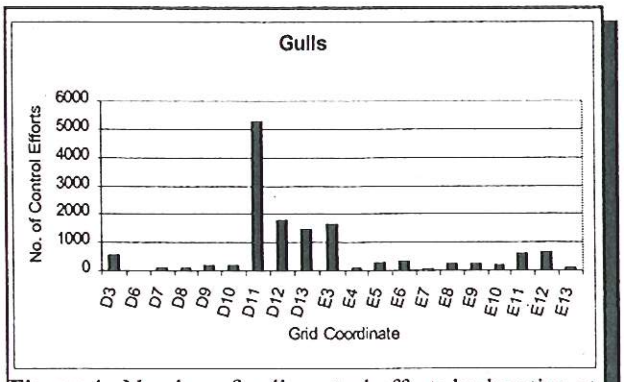


Figure 4. Number of gull control efforts by location at SIT, March 1998 - March 1999.

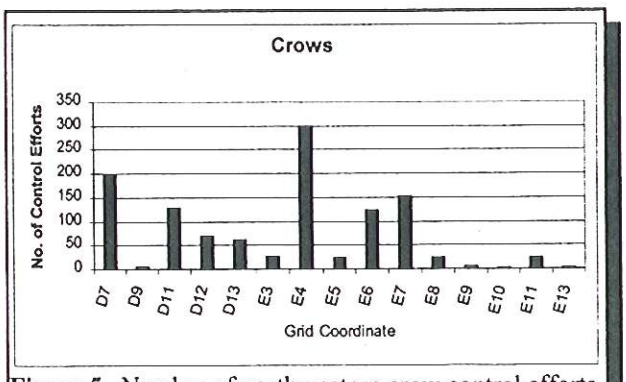


Figure 5. Number of northwestern crow control efforts by location at SIT, March 1998 - March 1999.

A comparison can be made between these figures and Figures 25 - 28 in *Section 5.3-Runway Counts*. This comparison shows the difference between the location at which specific species were observed and where control efforts were concentrated. It should be noted that Figures 25 - 28 represent only birds that were seen on or over the runway whereas Figures 2 - 5 show control efforts that took place, many times, just off of the runway.

4.0 Legal Status of Wildlife Species

All wildlife species seen during the course of the WHA, with the exception of the European starling (*Sturnus vulgaris*), are protected by both federal and state law. A federal depredation permit and a state public safety permit are required for wildlife hazard operations involving the harassment and taking of animals. Bird species are afforded protection under the Migratory Bird Treaty Act of 1918 and a federal depredation permit is required to harass or destroy migratory species. It should be noted that the term "migratory" as referred to in the Migratory Bird Treaty Act does not necessarily mean that the species has to migrate. Common ravens, which are year-round residents in Sitka, are protected as a migratory species under this act. Bald eagles are further protected by the Bald Eagle and Golden Eagle Protection Act of 1940. This act prevents the lethal control of eagles under any circumstances and also protects nesting habitat from being disturbed. Special permission for the harassment of bald eagles is required on both federal and state permits.

Two federally listed endangered species, the humpback whale (*Megaptera novaeangliae*) and Steller sea lion (*Eumetopia jubatus)*, were seen at SIT during the WHA. However, both of these species pose no hazard to aircraft safety and should not be affected by any recommendations regarding wildlife hazards. Appendix 9 shows the current list of endangered species in Alaska.

The harassment and taking of game is also regulated under the Alaska Statutes and the Alaska Administrative Code. All wildlife species observed during the WHA are considered "game" species by Alaska law. Appendix 10 gives the specific statute and administrative code numbers that apply to wildlife hazard abatement on airports. A public safety permit for the harassment and taking of game species at airports is issued by ADF&G. The airport maintained permits from both the USFWS and ADF&G for the harassment and taking of ravens, crows, gulls, and mallards during the WHA. The airport was also permitted to harass bald eagles.

5.0 Methods

Five different survey methods were employed during the course of the study. Although the objective of each survey type varied, they all shared the same general function of identifying wildlife hazards to aircraft safety. These five surveys represent the majority of observations made during the study. In addition to the five main surveys, data was collected on bird nesting occurrence and food selection of ravens and crows. Observations were recorded on WS Form 121-R (Airport Observation Sheet) and a Runway Count Data Form. A copy of each of these forms is provided in Appendix 11. A brief description of each of the main survey types follows.

5.1 Standardized Surveys

Standardized surveys were conducted twice a week to quantify wildlife abundance and seasonal trends in specific zones throughout the airfield. These surveys targeted the periods of highest bird

activity during early morning and late afternoon. Although mammal activity was recorded when observed, the Standardized Survey was mainly designed to document bird activity. A study area of less than 100 acres representing about 5% of the airport property was established from airport maps. The study area consisted of all airport land property on Japonski Island. The small size of the study area was due to the large percent of airport property comprised of open marine waters.

Ten points (located adjacent to the runway) were surveyed once in the morning and once in the afternoon twice each week. Each point covered an 8-acre area and was surveyed for a three minute period. All wildlife (bird and mammal) activity within a 328-ft. (100m) radius was recorded. Points were surveyed in the same order each time but a different starting point was chosen each survey. This gave a more complete time coverage for each point during the entire WHA. Given the density of vegetative and rocky cover within some points, there was a predisposition towards the observation of larger and more visible birds (e.g., eagles, gulls). Smaller birds (e.g., songbirds) were normally only counted when seen at a close range or in flocks, therefore the number of smaller birds may be underestimated. This observer bias was deemed acceptable due to the greater hazard posed by larger bird species. A total of 148 surveys were conducted. A map showing the location of each survey point and the GPS coordinates (in latitude and longitude) is included in Appendix 12.

5.2 Vehicle Surveys

Vehicle surveys were conducted once a week at the end of civil twilight, although none were conducted during the period of April 3, 1998 - August 4, 1998 due to the limited darkness in summer months. The survey consisted of driving a standard route around the perimeter of the runway. Using a spotlight for illumination, all wildlife were recorded and their activity noted. A total of 33 surveys were conducted. The intent of the Vehicle survey was primarily to document nocturnal wildlife activity. A map showing the survey route is included in Appendix 13.

5.3 Runway Counts

Runway counts were performed from the back of a pickup truck parked on the LDA access road directly across the runway from taxiway B. The number of counts varied on a weekly basis from 1 - 4, with the exception of two weeks when no counts were performed. Runway count start times were chosen at random from a period beginning ½ hour after sunrise and ending ½ hour before sunset. Runway counts were not performed during periods of high winds, heavy rain, snow, or fog due to the limited visibility. All wildlife occurring on or over the runway during a ½ hour count were recorded. A total of 99 runway counts were completed. The objective of this survey was to identify species which were a direct hazard to aircraft during takeoff and landing. Runway counts identified critical crossing patterns over the runway and which species were involved. Gulls could not be accurately identified to species due to the distance involved in most sightings.

5.4 Near-shore Surveys

Near-shore surveys were conducted twice a week, once at high tide and once at low tide on the same day. All wildlife within ¼ mile of the runway in open water or on rock islands were counted. The

survey area was divided into five bodies of water labeled as Tidal Pond, Middle Channel, Sitka Sound, Whiting Harbor, and Western Channel. Some days contained only one survey, as some peak tides fell outside of daylight hours. Thirty-three low tide surveys and 38 high tide surveys were conducted for a total of 71 near-shore surveys. The objective of this survey was primarily to document bird activity that occurred in the vicinity of the runway but outside of the Standardized Survey observation points. All wildlife species, including marine mammals, were recorded. The survey was also designed to document any potential correlation between wildlife activity and the tides.

5.5 General Observations

General observations were conducted five days a week, with some days containing multiple surveys. General observations did not have a specific format and allowed for greater flexibility when making field observations. A check for wildlife carcasses was performed on each of these surveys when conducted on the runway. This was done in an attempt to document wildlife strikes that may have gone undetected by pilots or airport personnel. General observations identified specific wildlife attractants, patterns, and other information that may have been observed outside the temporal and spatial parameters of the other more structured surveys. These general observations were difficult to quantify, but often provided the most useful observations for understanding and resolving wildlife strike hazards. During these observations, wildlife hazards and important environmental changes were noted. Possible offsite wildlife attractants, including seafood waste disposal in the Sitka channel and several gull roosting areas, were monitored.

5.6 Nest Searches

During the last two weeks of May 1998 nest searches were conducted in all short and long grass cover types on the airport. Nesting individuals were flushed by dragging a 50m rope between two people across the ground. An attempt was made to locate nests by following flushed individuals back to the nest site. One search was conducted in each area as only a small number of potentially nesting individuals was discovered. The objective of the nest searches was to document the use of various vegetative cover types as nesting habitat and to identify which species, if any, nest on the airport.

5.7 Raven/crow Food Analysis

Ravens and crows that were taken during wildlife control operations were held for crop/gizzard analysis. The contents of the crop/gizzard of each bird were removed and examined. An attempt was made to identify contents to a specific group such as crustaceans, molluscs, or berries. The objective of this food analysis was to determine what types of food items are eaten by ravens and crows on the airport. The presence of these food attractants on the airport increases the likelihood of bird activity on or next to the runway.

6.0 Results & Discussion

The results of the WHA surveys are grouped according to survey type. When appropriate, seasonal trends in wildlife occurrence are noted and selected "key species" are shown. A key species is one whose frequency of occurrence, abundance, size, or behavioral characteristics makes it a direct threat to aircraft safety. Abundance is the total number of individuals of a species. Frequency is defined as the percentage of observations of a particular species. For example, a solitary species may have been frequently observed but in low numbers, whereas a flocking species may have been infrequently observed, but in large numbers.

The actual threat of a given species to aircraft safety is influenced by many factors. Among these factors are the animal's mass, frequency, abundance, behavior, and the type and speed of the aircraft. All animals that were observed during the course of the study were considered potential hazards to aircraft safety, regardless of whether they were actually seen on the runway or causing damage. Due to their use of certain cover types, some species are less likely to pose a risk than others. Therefore, it is necessary to identify key species which are most likely to pose a risk to aircraft safety.

Effective wildlife hazard management at airports is dependent on the identification of the key species involved. The following tables, figures, and verbal descriptions focus primarily on these key species. A list showing all wildlife species observed is provided in Appendix 14. The guild classification is used only in the Standardized Survey *Results (Section 6.1)*. All other results are presented on a species specific basis.

All data was analyzed using a computer database designed by WS, Alaska District entitled Wildlife Hazard Management Information System (WHMIS). This database is compatible only with Microsoft Access 97. The data collected during the WHA can be provided to AKDOT&PF on request, but a copy of WHMIS is necessary to view the data.

6.1 Standardized Surveys

Standardized Survey results are presented in Table 2. This table shows the *Abundance, Mean Abundance per Survey (+/-) Standard Error (SE), and Frequency* for each species. *Abundance* is the total number of individuals seen during the WHA. It can be more accurately defined as the number of "wildlife hazard occurrences" observed during the WHA. As any wildlife species that occurs on the airport could potentially occur on the runway, the occurrence of any species is considered a potential risk to aircraft safety. The *Abundance* numbers do not represent a population count because the same individuals may have been counted in multiple surveys. *Mean Abundance per Survey* is the average number of individuals per survey. The *SE* represents the possible deviation from the mean abundance should a survey be conducted again. *SE* was high in relation to some means possibly due to a relatively small sample size (148 surveys total) or to high variability in bird use of the airfield over time. This is important because it demonstrates the need for caution when predicting future bird abundance based solely on historical data. *Frequency* is the number of observations of a particular species, and was converted to a percentage of observations

in which that species was present. Frequency is useful for detecting aberrations in abundance, because the abundance may have shown a large population of birds moving through but the occurrence may only have happened a single time, indicating a lower strike probability (e.g. pine siskins).

Table 2. Descriptive statistics for WHA Standardized Survey data at SIT, Alaska from March 1998 - March 1999. Abundance represents the total number of occurrences observed during the WHA.

Species	*Abundance*	*Mean Abundance per Survey*[1]	*Standard (+/-) Error*	*Frequency*[2] *(%)*
American dipper	1	1	0	0
American kestrel	8	1	0	1
American pipit	168	84	115	0
American robin	24	3	5	1
American tree sparrow	4	2	1	0
American wigeon	31	3	2	1
Bald eagle	172	2	2	8
Barn swallow	34	3	4	1
Barrow's goldeneye	22	3	3	1
Belted kingfisher	6	1	0	0
Black turnstone	39	10	3	0
Black-bellied plover	3	3	0	0
Black-legged kittiwake	1	1	0	0
Bufflehead	191	5	4	3
Canada goose	31	5	7	0
Common goldeneye	1	1	0	0
Common loon	35	2	1	2
Common merganser	21	2	1	1
Common raven	190	2	3	8
Common snipe	16	1	1	1
Dark-eyed junco	2	1	0	0
Double-crested cormorant	22	1	0	1
Dunlin	21	5	7	0
European starling	35	3	2	1

Species	*Abundance*	*Mean Abundance per Survey*[1]	*Standard (+/-) Error*	*Frequency*[2] *(%)*
Fox sparrow	18	1	1	1
Glaucous-winged gull	832	8	10	20
Golden-crowned sparrow	10	3	1	0
Great blue heron	15	1	1	1
Greater scaup	29	3	2	1
Greater white-fronted goose	13	4	3	0
Greater yellowlegs	5	2	1	0
Green-winged teal	9	5	4	0
Harbor porpoise	24	3	2	0
Harbor seal	22	1	0	1
Harlequin duck	382	6	4	7
Hermit thrush	1	1	0	0
Herring gull [3]	1137	14	37	15
Horned grebe	111	3	3	4
Hudsonian godwit	1	1	0	0
Killdeer	16	3	2	0
Least sandpiper	33	8	15	0
Lesser scaup	54	6	5	1
Lesser yellowlegs	6	2	1	0
Lincoln's sparrow	117	3	2	5
Long-billed dowitcher	2	2	0	0
Mallard	192	4	3	3
Marbled murrelet	12	2	1	1
Merlin	1	1	0	0
Mew gull	208	12	30	2
Mink	7	1	0	0
Northern flicker	1	1	0	0
Northern goshawk	2	1	0	0

Species	*Abundance*	*Mean Abundance per Survey*[1]	*Standard (+/-) Error*	*Frequency*[2] *(%)*
Northern harrier	4	1	1	0
Northern shoveler	3	3	0	0
Northwestern crow	208	4	4	6
Oldsquaw	8	2	1	0
Orange-crowned warbler	25	2	1	1
Pacific golden-plover	26	4	4	0
Pacific loon	6	2	1	0
Pectoral sandpiper	1	1	0	0
Pelagic cormorant	21	1	0	1
Pigeon guillemot	1	1	0	0
Pine grosbeak	9	3	2	0
Pine siskin	248	62	96	0
Red-breasted merganser	6	3	1	0
Red-necked grebe	2	1	0	0
Red-necked phalarope	19	10	12	0
Red-tailed hawk	1	1	0	0
River otter	8	1	1	0
Rock sandpiper	3	2	1	0
Rufous hummingbird	5	1	1	0
Savannah sparrow	359	6	5	11
Sea otter	1	1	0	0
Semipalmated plover	26	4	4	1
Short-billed dowitcher	1	1	0	0
Song sparrow	185	2	1	9
Spotted sandpiper	1	1	0	0
Surf scoter	83	4	2	1
Surfbird	81	16	12	0
Swainson's thrush	16	2	1	1

Species	*Abundance*	*Mean Abundance per Survey*[1]	*Standard (+/-) Error*	*Frequency*[2] *(%)*
Trumpeter swan	2	2	0	0
Unidentified Calidris spp.	142	20	30	1
Unidentified Passerine spp.	10	10	0	0
Varied thrush	14	3	3	0
Western flycatcher	1	1	0	0
Western sandpiper	77	11	13	1
White-winged scoter	53	5	6	1
Wilsons's warbler	1	1	0	0
Yellow warbler	4	2	1	0

[1] Mean Abundance per Survey calculated by taking the average number of individuals per survey from surveys in which that species was observed.

[2] Frequency was calculated by taking the percentage of observations in which that species was observed.

[3] The accuracy of herring gull (*Larus argentatus*) identification was complicated by the hybridization of glaucous-winged gull (*Larus glaucescens*) and herring gulls which produce individuals having somewhat indeterminate plumage. Furthermore, some of the individuals identified as herring gulls may have been Thayer's gulls (*Larus thayeri*) based on recently reviewed information from Armstrong 1998. This possible discrepancy in gull identification was deemed acceptable since the recommended gull management techniques do not vary significantly between species.

Table 2 shows relatively low abundance totals for many species. These low numbers are affected by temporal variation in species abundance, with many species occurring in only one season. Several groups of birds did have relatively higher abundance totals, including eagles, ravens, crows, gulls, waterfowl, and some songbirds. These groups were, in most cases, common throughout the year. However, the low mean abundance presented in Table 2 should be interpreted with caution because of variability in spatial use patterns among the different survey points. For example, Point 1 may have represented 80% of the observations of a particular species, whereas Point 3 may not have had any.

The occurrence of unidentified *Calidris spp.* (Sandpipers) in Table 2 is explained by the observation of mixed species flocks of sandpipers. These mixed flocks of sandpipers were present mostly in the months of August and September. Due to the difficulty in differentiating several of these species in mixed flock situations, they were grouped simply as unidentified *Calidris spp.* The occurrence of unidentified *Passerine spp.* in Table 2 represents one observation of a flock of songbirds in the shrubs at the mausoleum. Due to poor light conditions, the species could not be identified.

The data presented in Table 2 does not give information about population dynamics of the species, but rather is to be used as an index of the relative abundance of individuals across time. A comparative analysis between years could be established using this data if the airport were to

continue to conduct periodic surveys, although it may be necessary to decrease the frequency of surveys due to logistical constraints.

6.1a Birds

For the purpose of simplification, species observed during Standardized Surveys were grouped into guilds. Guild 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. It should be noted that the following guild classifications may differ slightly from those found in standard wildlife literature regarding animal taxonomy, but they still tend to loosely correspond with traditional taxonomic classifications.

Guild Classifications

Dabblers - Waterfowl that feed on floating or submerged aquatic vegetation, grass, or insects, and are associated with puddles, ponds, wetlands, and sometimes short grass areas. These species spend a great deal of time loafing around the edge of the tidal pond and sometimes in temporary puddles on the infield. They are sometimes seen in the ocean close to the runway. Daily movements between airfield water sources resulted in an increased frequency of these birds over the runway. This was a concern because of the increased potential of a wildlife strike. These birds do not usually dive when frightened. This group includes swans, geese, and freshwater ducks.

Divers - Waterfowl species that feed on submerged aquatic vegetation, fish, or aquatic insects and are associated strictly with open water (e.g. ponds, ocean). These species spend most of their time feeding or loafing in the tidal pond and ocean. These birds will often dive when frightened. This group includes freshwater ducks, sea ducks, sea birds, loons, grebes, and cormorants.

Fish-eaters - Non-waterfowl bird species that are attracted to open water sources solely for the purpose of feeding on fish. This group is largely comprised of herons, terns, and kingfishers.

Gulls - Commonly called "seagulls", this group of birds includes gulls and kittiwakes. These birds are generally characterized as having white bodies with gray backs and a yellow bill. They are often seen foraging in large flocks, sometimes as many as 5,000 birds, next to the runway in open marine waters. Gulls often spend time roosting on offshore rock islands and on the tidal pond when it is frozen.

Insectivores - Small flocking birds that feed primarily on insects and are associated with the grass and shrub cover types. This group includes swallows, pipits, and starlings.

Raptors - Birds of prey seen hunting or perched on the airport in search of small game. This group includes hawks, owls, and falcons.

Scavengers - Birds whose primary means of foraging is the scavenging of fish, intertidal invertebrates, or dead animals. These birds utilize most of the cover types present on the airport and

spend large amounts of time on or next to the runways. This group includes ravens, crows, and eagles.

Shorebirds - Small coastal migrants characterized by large flock size during migrational periods, and associated primarily with short grass and the runway. These birds were most abundant during periods of heavy rain in August and September when worms and insects were washed onto the runway from the infield. This group consists of sandpipers, plovers, and turnstones.

Songbirds - Small perching and flocking birds associated with tall grass, shrubs, and woodland. These birds are generally not hazardous to aircraft safety and were not considered "key species". This group is comprised of sparrows, warblers, and finches. *It should be noted that although this group of birds is generally considered less hazardous than other species, the potential for a wildlife strike exists with "any" species that crosses the runway at one time or another. This is evidenced by the strike in Table 1 with the golden-crowned sparrow.*

Figure 6 depicts the relative proportion (as a percentage) of bird abundance during standardized surveys. The *Songbirds* guild is not shown because it was not comprised of key species, therefore represents a relatively low potential hazard to aircraft operations. All percentages were rounded to the nearest whole number. Both the *Raptors* and *Fish-eaters* comprised of a small number of individuals with a percentage less than 0.5%.

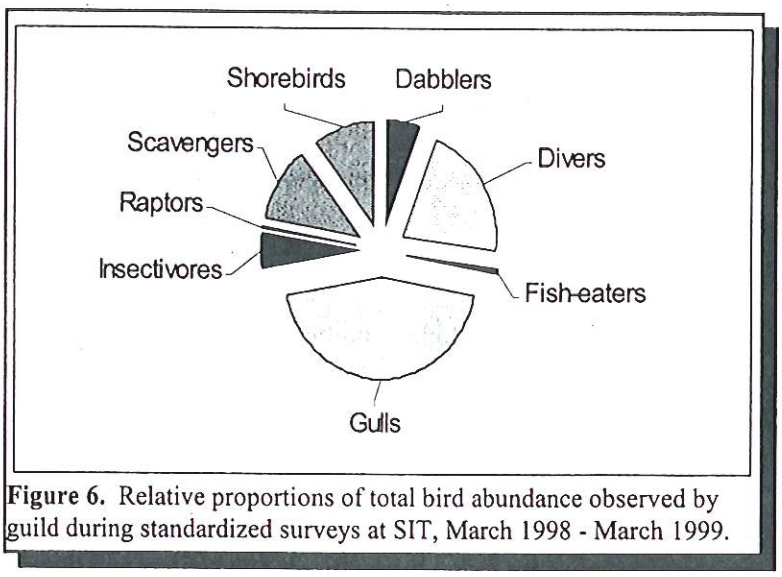


Figure 6. Relative proportions of total bird abundance observed by guild during standardized surveys at SIT, March 1998 - March 1999.

In order to show the temporal variation in wildlife abundance, the Standardized Survey results have been grouped by guild for the year. *Songbirds* are not shown in the following data summaries due to their almost exclusive use of long grass and shrub cover types. On only several occasions were any songbird species seen flying over the runway. Songbirds were most abundant during the spring, summer, and fall seasons with a dramatic decrease in the winter. Flocks of pine siskins (*Carduelis pinus*) and savannah sparrows (*Passerculus sandwichensis*) were seen crossing the runway, although infrequently. Although bird species belonging to the *Songbirds* guild are generally considered less hazardous to aircraft than other species, they can present a risk, particularly when flocking. Species such as pine siskins and pine grosbeaks (*Pinicola enucleator*) can be particularly hazardous when feeding and flying in large flocks. As such, recommendations for modifying the habitat for these birds are made in the **Recommendations** section of this report.

The abundance of each guild throughout the year (categorized by month) and frequency of observations for each guild at different locations on the airfield are shown in the following bar

graphs. The frequency distributions show the proportion of time a particular guild was observed at each point during Standardized Surveys, but they do not give information about the number of individuals seen. An aerial photograph in Appendix 12 gives the Standardized Survey point locations. These figures give frequency totals which can be used to rank the relative wildlife activity at various locations around the airfield.

Dabblers

Dabblers, specifically mallards, were present loafing and feeding in the tidal pond at D8 and the ocean next to the mausoleum at D11 during winter and spring months (Figure 7). The presence of standing water in the infield areas contributed to a slightly elevated number of Dabblers in March,

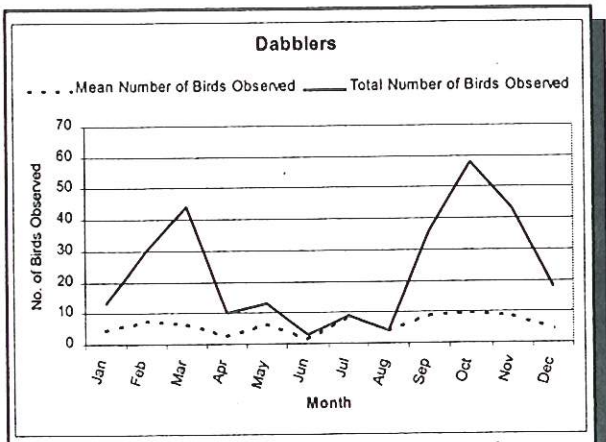


Figure 7. Monthly total and mean number of dabblers observed per day during standardized surveys at SIT, March 1998 - March 1999.

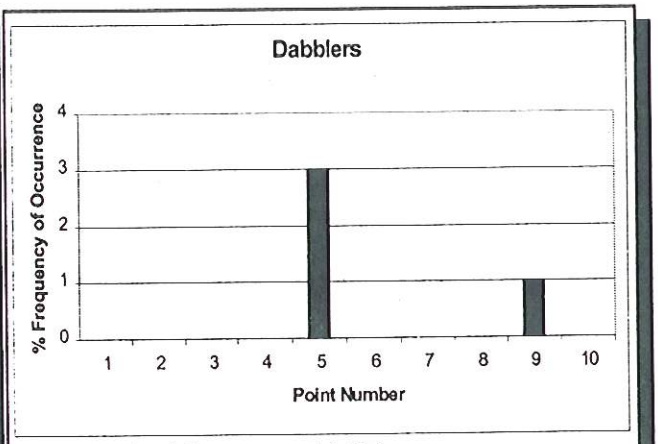


Figure 8. Total frequency of dabbler occurrence per standardized survey point location at SIT, March 1998 - March 1999.

specifically mallards. A flock of seven greater white-fronted geese (*Anser albifrons*) and several green-winged teal (*Anas crecca*) were observed during spring migration. During summer months, many Dabbler species were on their breeding grounds or in higher quality nesting habitat off airport property, therefore, they were rarely observed at the airport. Dabbler numbers increased on the airfield during fall months, corresponding to the increase in birds observed during the fall migration. American wigeon (*Anas americana*), mallards, and Canada geese (*Branta canadensis*) were all present during this period. Both American wigeon and mallards were seen most often feeding or loafing in the tidal pond at D8, while Canada geese were seen at a variety of locations around the airfield. Grass areas that had been mowed previously that year were commonly used by feeding geese. The exact correlation between grass height and goose foraging at SIT is unknown however. These were typically small numbers of geese, flocks of three or four, that tended to roost on the airfield at night. During the fall, Canada geese, as well as greater white-fronted geese, seemed especially difficult to deter using pyrotechnics.

Divers

Divers including bufflehead (*Bucephala albeola*), scaup (*Aythya spp.*), and cormorants (*Phalacrocorax spp*) were present in small flocks in near-shore marine waters in the spring. The number of Divers increased in the fall due to the arrival of several species that winter in southeast Alaska. These species included common loon (*Gavia immer*), harlequin duck (*Histrionicus histrionicus*), and white-winged scoters (*Melanitta fusca*). Bufflehead and scaup were present in small flocks in the tidal lagoon during the winter.

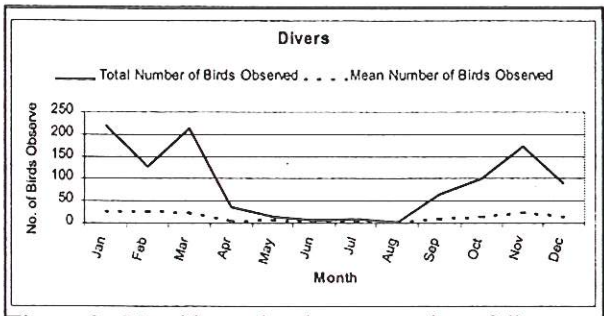


Figure 9. Monthly total and mean number of divers observed per day during standardized surveys at SIT, March 1998 - March 1999.

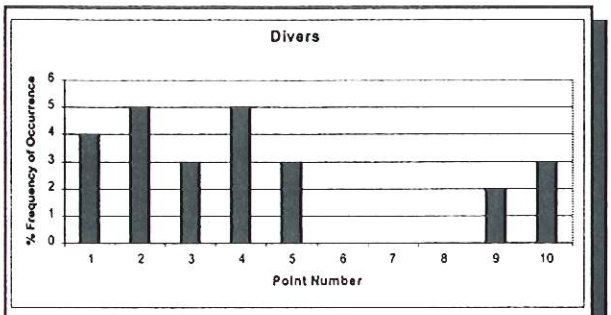


Figure 10. Total frequency of diver occurrence per standardized survey point location at SIT, March 1998 - March 1999.

Fish-eaters

The number of fish-eaters, specifically great blue herons (*Ardea herodias*) and belted kingfishers (*Ceryle alcyon*) did not differ significantly throughout the year. Although the total number of these birds remained low, great blue herons have a high potential for causing damage based on their mass and slow-flying behavior. They also tend to be more active at night, which could account for the low number of birds observed during the day. Fish-eaters were most often seen feeding in the intertidal zone adjacent to the runway.

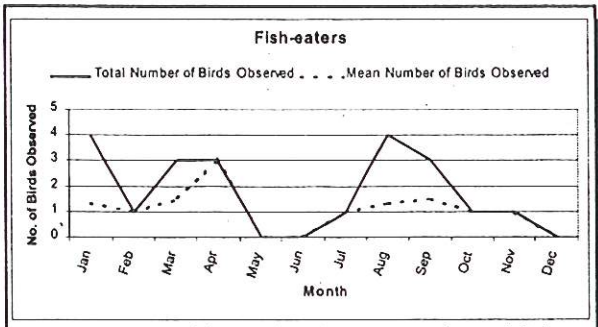


Figure 11. Monthly total and mean number of fish-eaters observed per day during standardized surveys at SIT, March 1998 - March 1999.

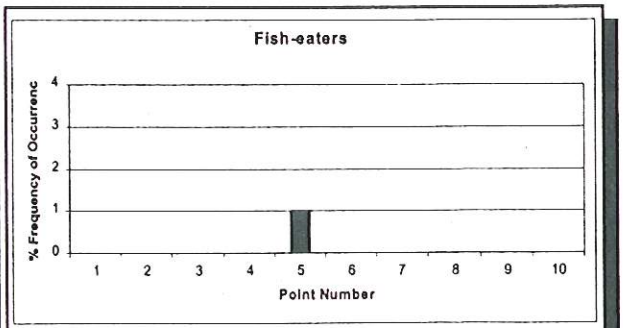


Figure 12. Total frequency of fish-eater occurrence per standardized survey point location at SIT, March 1998 - March 1999.

Gulls

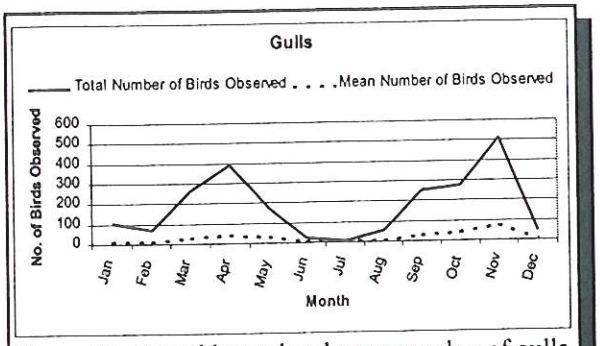


Figure 13. Monthly total and mean number of gulls observed per day during standardized surveys at SIT, March 1998 - March 1999.

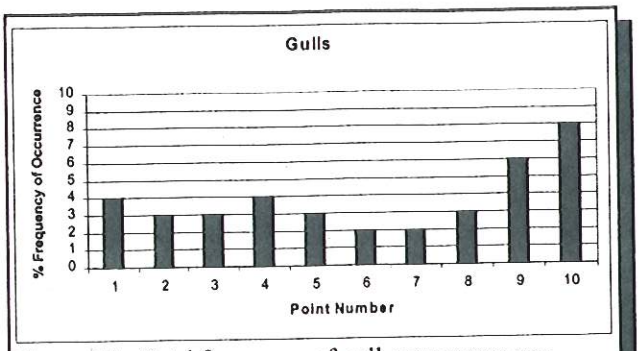


Figure 14. Total frequency of gull occurrence per standardized survey point location at SIT, March 1998 - March 1999.

A rise in the number of gulls observed was documented in April. This is most likely attributed to presence of the Pacific herring spawn in kelp beds and along rocks in near-shore marine waters. The herring spawn is described as the period of egg-laying and hatching by Pacific herring (*Clupea pallasii*) during the period from early March through April. The effect of the herring spawn on bird abundance is discussed in more detail in section *6.8b Natural Attractants*. As birds moved to their nesting grounds in early summer, the number of gulls dropped. A peak was observed during the fall migration as many gulls moved southward. Although many gulls spend the entire year in Sitka, some are short distance migrants, spending the winter in the Vancouver Island area and moving north during the summer as food once again becomes abundant. The majority of birds in the fall were immature age gulls. The largest flock size observed during one count was 300 birds in November.

Insectivores

Several observations of a large flock of American pipits (*Anthus rubescens*) feeding in grassy areas were responsible for the majority of Insectivore abundance in the spring (Fig. 15). American robins

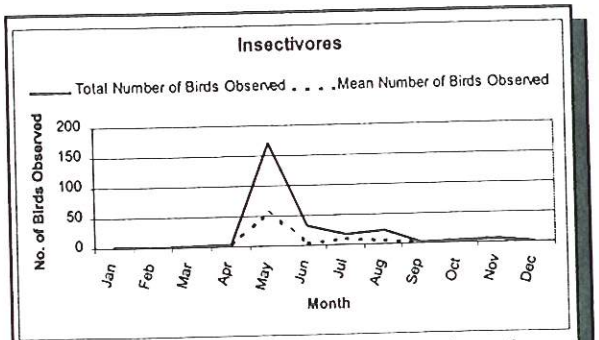


Figure 15. Monthly total and mean number of insectivores observed per day during standardized surveys at SIT, March 1998 - March 1999.

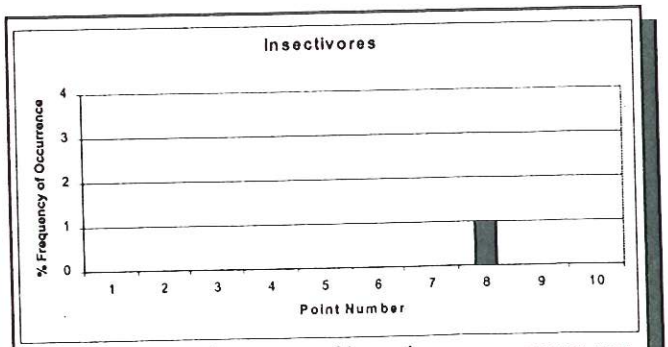


Figure 16. Total frequency of insectivore occurrence per standardized survey point location at SIT, March 1998 - March 1999.

(*Turdus migratorius*) and European starlings were present in smaller numbers and were feeding in both grass and shrub cover types.

Raptors

The number of raptors remained relatively low throughout the year. Although Figure 17 shows a peak in the number of birds seen in both the spring and fall, it is not significant. Only one of the species observed, the American kestrel (*Falco sparverius*), was seen foraging on the airfield. Several species of Raptors, including merlin (*Falco columbarius*), northern goshawk (*Accipter gentilis*), and a red-tailed hawk (*Buteo jamaicensis*) were seen in the spring during migration but spent little time on the airfield. The remaining raptor species were seen only flying over the airfield but not landing. American kestrels were observed chasing flocks of pine siskins in woodland areas and also perching on runway lights and other airfield structures. Although they may appear only infrequently on the airfield, raptors may spend a great deal of time loafing on or flying over the runway. The bird strike involving a merlin in September of 1998 underscores the threat even infrequently occurring species can pose. Although the data from Standardized Surveys does not show a significant risk by most raptor species, several General Observations of raptors on the airfield indicate a more significant risk (Section 6.5).

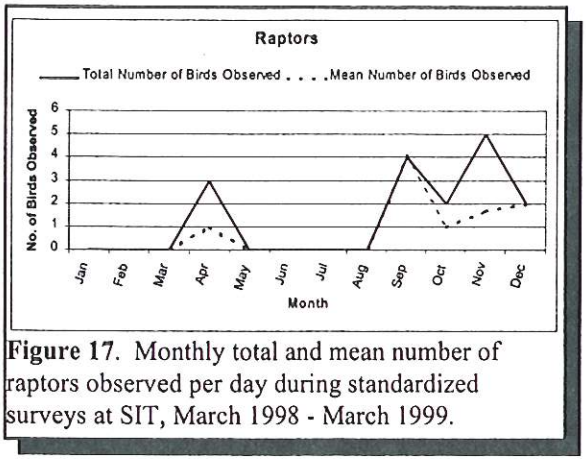


Figure 17. Monthly total and mean number of raptors observed per day during standardized surveys at SIT, March 1998 - March 1999.

Scavengers

Scavengers were less abundant in the summer than in the spring. Northwestern crows were the most abundant Scavengers in the summer, accounting for the largest percentage of any Scavenger species. Crows were observed feeding in a variety of cover types including shrubs and the intertidal zone. These birds were typically observed in flocks of 20 - 30 individuals and were frequently observed flying between their loafing areas at C7 in the spruce/hemlock woodland and their feeding areas

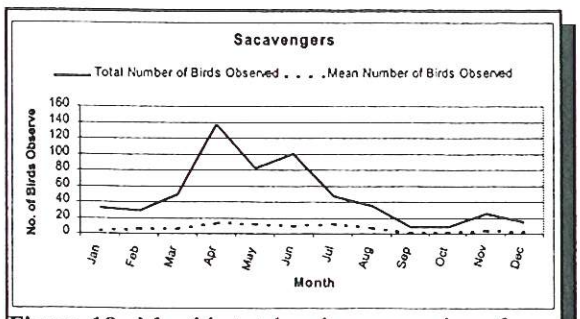


Figure 18. Monthly total and mean number of scavengers observed per day during standardized surveys at SIT, March 1998 - March 1999.

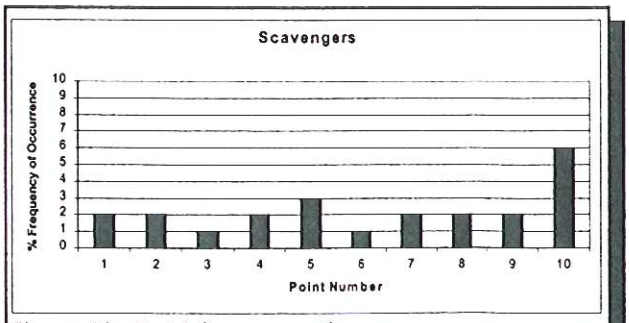


Figure 19. Total frequency of scavenger occurrence per standardized survey point location at SIT, March 1998 - March 1999.

along the runway intertidal zone. The number of bald eagles and common ravens remained relatively constant throughout the year.

Shorebirds

Shorebirds, particularly sandpipers, were present in small flocks flying over the ocean and infield areas at low altitudes during the spring. Most of these birds spent little time on the airfield during the spring, and were seen during their northward migration to breeding grounds in the western and northern regions of Alaska. Shorebirds represented the highest abundance of any guild during the

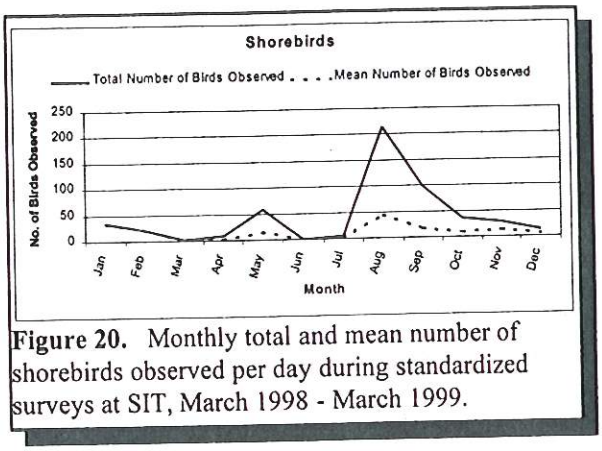


Figure 20. Monthly total and mean number of shorebirds observed per day during standardized surveys at SIT, March 1998 - March 1999.

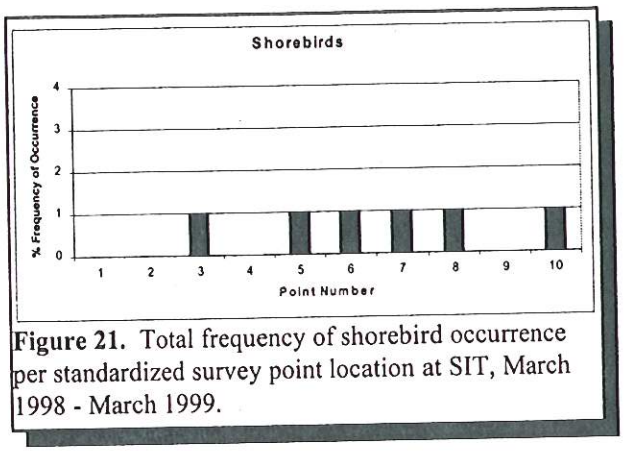


Figure 21. Total frequency of shorebird occurrence per standardized survey point location at SIT, March 1998 - March 1999.

summer (Figure 20). Most of these birds were sandpipers (*Calidris spp.*) and semipalmated plovers (*Charadrius semipalmatus*) which were on their southward migration in August. These birds spent a great deal of time in grassy infield areas and on the runway itself feeding on worms and insects. Several species, including black turnstones (*Arenaria melanocephala*) and surfbirds (*Aphriza virgata*), were observed only on intertidal rocky areas feeding on molluscs.

6.1b Mammals

Standardized Surveys did not show any clear trends in mammal occurrence. River otter and mink (*Mustela vison*) were seen sporadically at points along intertidal areas. Two species of marine mammals, the harbor porpoise (*Phocoena phocoena*) and harbor seal (*Phoca vitulina*), were seen frequently, feeding in near-shore marine waters. These marine mammal species pose no recognizable hazard to aircraft safety. One sea otter (*Enhydra lutris*) was also observed in near-shore marine waters. The Standardized Survey was designed to document bird occurrence during daylight hours.

6.2 Vehicle Surveys

Figure 22 represents the results of 33 vehicle spotlight surveys conducted during the periods of March 98 - April 2, 1998 and August 5, 1998 - March 1999. The vehicle surveys helped to document wildlife activity at night. The survey start times varied depending on the onset of civil

twilight throughout the year. Species seen feeding on the airfield at "night" in the winter may not have been seen feeding at "night" in the spring or fall, because in these cases, wildlife activity may have been less a function of available light and more a function of normal daily activity patterns.

The occurrence of certain species at night does, however, indicate a need for wildlife control operations after dark and surrounding aircraft movements. Dabblers, specifically mallards and green-winged teal, were observed feeding after dark in temporary standing puddles in grassy infield areas.

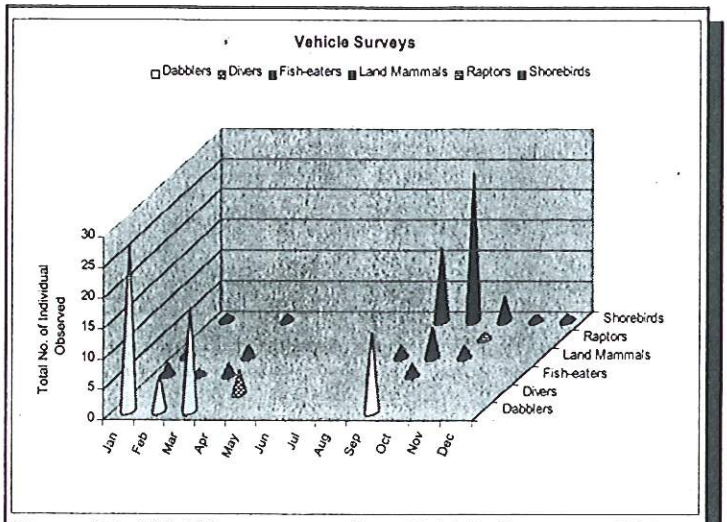


Figure 22. Wildlife occurrence from Vehicle Surveys at SIT, March 1998 - March 1999. No surveys were conducted from May through August due to extended periods of daylight.

Bufflehead were active at night in the tidal pond at D10. One species of fish-eater, the great blue heron, was observed feeding in intertidal zones next to the runway at night. Although seen in small numbers, usually one or two individuals, their large body mass (2,204 - 2,576 grams) and slow flying ability make the great blue heron a particular threat to aircraft. Mink were seen frequently at night along the edge of the runway and in rocky intertidal zones. Although mink were not seen on the runway itself, they could pose a hazard to jet aircraft of engine ingestion if they were to be on the runway during a takeoff or landing. One Raptor, a short-eared owl, was seen on Vehicle Surveys. This owl is normally a diurnal (daytime) foraging species but will also hunt at night. This bird was seen only during the fall migration and was not observed foraging on the airfield. It does present a hazard to aircraft due to its tendency to fly low to the ground over open areas. Shorebirds were observed at night roosting on the runway and feeding in grassy infield areas. These birds were most abundant during fall migration. Shorebirds, which included plovers, sandpipers, and snipe, were apparently feeding on worms, insects, and arthropods (such as pillbugs) that were flushed to the surface of the ground during rainy periods.

Although none of the species seen on Vehicle Surveys are considered strictly nocturnal (meaning they are active mostly at night), they all will remain active throughout various times of darkness when food is readily abundant. Puddles of temporary standing water seemed to be the greatest attractant in grassy infield areas for dabbling ducks and shorebirds. Although gulls were not observed roosting on the runway after dark, this particular behavior has been documented in the past by SIT wildlife control personnel. It should be considered that nighttime wildlife hazards do exist at SIT, and wildlife control efforts should include runway sweeps surrounding aircraft movements at night.

6.3 *Runway Counts*

The purpose of Runway Counts was to identify those species which occur on or over the runway on a frequent basis. Although most wildlife species that were observed in areas surrounding the runway could, at anytime, cross the runway when moving between areas, certain species are more likely to cross the runway on a frequent basis due to their unique behavioral patterns. Those species that frequent the runway on a regular basis are more likely to be involved in a collision with aircraft. Runway Count data was analyzed for correlations between wildlife activity and weather patterns. Although no clear trends could be determined from the data collected, data from other airports does indicate that weather plays a role in influencing the behavior of certain species. The topic of weather and its influence on wildlife is discussed further under *Section 6.5 General Observations*. Runway Count data was also analyzed for time specific trends in bird activity. Although no specific correlations between the hour of day and the number of birds crossing the runway could be ascertained, time of day does influence the activity of birds who are either strictly nocturnal or diurnal feeders. Both gulls and crows (largely considered diurnal), the two largest groups of birds observed on Runway Counts, appeared to be active during all daylight hours.

Runway Count data did reveal interesting information regarding the number of birds which crossed the runway within 30 minutes of an aircraft movement (Table 3). An aircraft movement is defined as either a landing, take-off, or touch-and-go.

Table 3. Total number of birds observed crossing the runway at the interval of (x) minutes before an aircraft movement, SIT, March 1998 - March 1999.

Species	***Number of Birds Observed at the Interval of (x) Minutes Before Aircraft Movement (Number in Parenthesis is Cumulative Total)***					
	<1	**1 - 5**	**5 - 10**	**10 - 15**	**15 - 20**	**20 - 30**
Bald Eagle	10 (10)	196 (206)	34 (240)	27 (267)	19 (286)	6 (292)
Belted Kingfisher	0	1 (1)	0 (1)	0 (1)	0 (1)	0 (1)
Common Raven	7 (7)	327 (334)	54 (389)	45 (434)	12 (466)	23 (489)
Double-crested Cormorant	0	2 (2)	0 (2)	(2)	1 (3)	1 (4)
European Starling	31 (31)	129 (160)	113 (273)	43 (316)	27 (343)	12 (355)
Great Blue Heron	1 (1)	4 (5)	1 (6)	0 (6)	0 (6)	1 (7)
Greater White-fronted Goose	0	6(6)	0 (6)	0 (6)	0 (6).	0 (6)

Species	*Number of Birds Observed at the Interval of (x) Minutes Before Aircraft Movement (Number in Parenthesis is Cumulative Total)*					
	<1	**1 - 5**	**5 - 10**	**10 - 15**	**15 - 20**	**20 - 30**
Gull spp.	88 (88)	2,222 (2,310)	580 (2,890)	778 (3,668)	397 (4,065)	103 (4,168)
Killdeer	0	2 (2)	2 (4)	2 (6)	0 (6)	0 (6)
Long-billed Dowitcher	0	2 (2)	0 (2)	2 (4)	0 (4)	2 (6)
Mallard	0	16 (16)	0 (16)	0 (16)	0 (16)	0 (16)
Northern Pintail	0	0	0	3 (3)	0 (3)	0 (3)
Northwestern Crow	33 (33)	660 (693)	173 (866)	158 (1,024)	162 (1,186)	122 (1,308)
Pacific Golden Plover	0	6 (6)	0 (6)	0 (6)	0 (6)	0 (6)
Pine Siskin	0	0	0	0	40 (40)	0 (40)
Plover spp.	0	1 (1)	7 (8)	0 (8)	0 (8)	0 (8)
Sandpiper spp.	0	60 (60)	0 (60)	0 (60)	0 (60)	0 (60)
Sparrow spp.	2 (2)	14(16)	0 (16)	0 (16)	0 (16)	0 (16)
White-winged Scoter	0	4 (4)	0 (4)	0 (4)	0 (4)	0 (4)

Table 3 illustrates the potential hazard of species beyond what the wildlife strike record and Near Miss observations may indicate. The number of birds observed crossing the runway within 30 minutes of an aircraft movement indicates that current wildlife deterrent techniques may not be adequate to prevent wildlife movements in the airport environment surrounding air carrier operations. The majority of birds seen crossing the runway, however, originated from areas outside of the area controlled by airport personnel. These areas include a large spruce/hemlock tree stand northeast of the airport adjacent to the Coast Guard housing, offshore rock islands south of the runway, and surrounding marine waters. Some species observed crossing the runway before an aircraft movement were those regularly targeted during wildlife deterrent efforts, such as gulls, ravens, crows, and mallards. The occurrence of commonly targeted species shortly before aircraft movements indicates that currently used wildlife deterrent techniques and/or applications of these techniques may not be having the desired long-term effect of repelling individual birds from the runway. Runway Count data suggests that wildlife control efforts should be sustained until the last possible moment preceding an aircraft movement.

Gulls and crows were the most abundant and frequently observed species crossing the runway. Species with low cumulative totals were generally observed less frequently. While this indicates a lower probability of being struck by an aircraft, many species should still be considered hazardous to aircraft safety. For example, double-crested cormorants (*Phalacrocorax auritus*) were rarely observed crossing the runway, but their body mass and low flying behavior makes them particularly hazardous to aircraft if they are struck.

Runway Count data revealed that gulls were the group of birds most frequently involved in runway crossings. It was useful to analyze the direction of movement for gulls in relation to the runway. Figure 23 shows the total number of gulls observed crossing in a particular direction. This figure indicates that 97% of the gulls observed crossed roughly perpendicular to the runway (either north through east or south through west). Birds that cross perpendicular to the runway are less likely to be involved in an aircraft collision than birds that fly parallel to and over the runway, due to the smaller amount of time spent in an aircraft movement area.

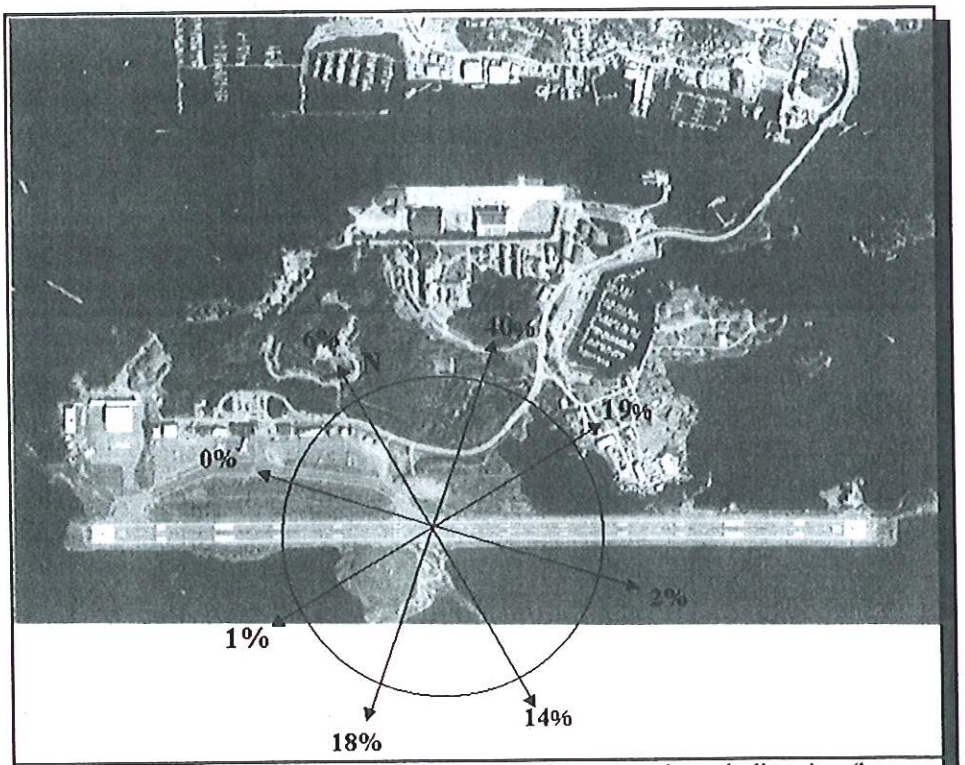


Figure 23. Relative abundance of gulls crossing the runway in each direction (by percent), based on runway count data at SIT, March 1998-March 1999.

Sixty-four percent of the gulls seen were flying towards Baranof Island and downtown Sitka. There are several attractants in the city of Sitka that are probably responsible for this large number of bird movements. The discharge of seafood processing waste into the Sitka Channel, the feeding of birds by people in Swan Lake Park, and the availability of trash from open dumpsters throughout town, all provide gulls and other scavenging birds (e.g., crows and ravens) with food. These human induced food sources further habituate birds to human presence and disturbance, making the deterrence of birds on the airfield through non-lethal means difficult.

Figures 24 - 27 show the distribution of eagles, ravens, gulls, and crows along the runway. The airport grid map (Appendix 8) should be used to compare coordinate numbers on the x-axis of Figures 24 - 27 with specific portions of the runway. For birds that were not utilizing any portion of the surrounding ground cover, specifically gulls, ground cover type played little role in influencing crossing patterns. For eagles, crows, and ravens which spend more time feeding and

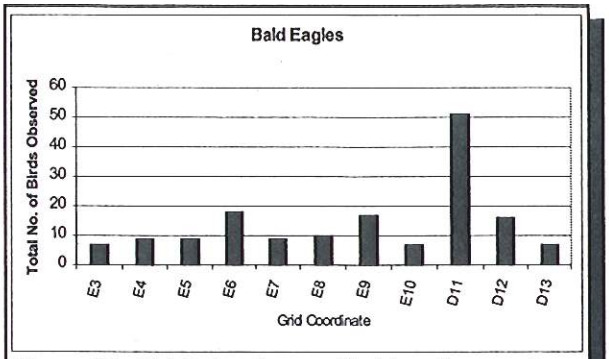


Figure 24. Total abundance of bald eagles crossing the runway by grid coordinate from Runway Count data at SIT, March 1998 - March 1999.

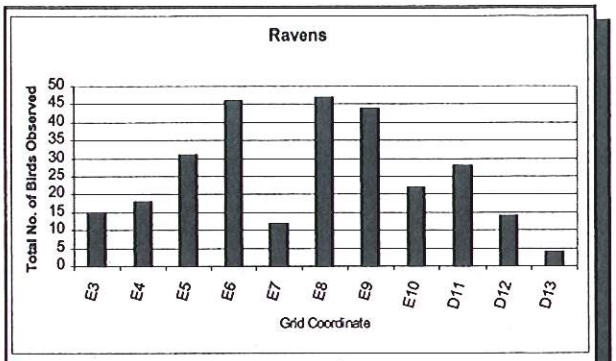


Figure 25. Total abundance of common ravens crossing the runway by grid coordinate from Runway Count data at SIT, March 1998 - March 1999.

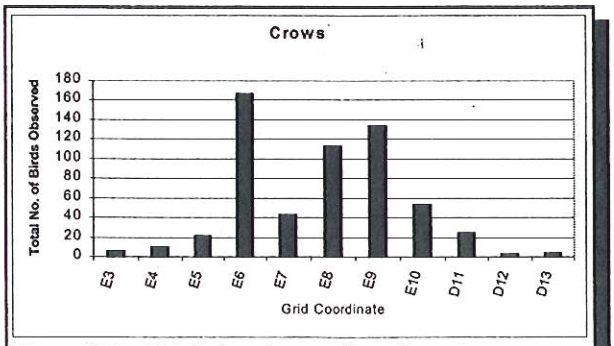


Figure 26. Total abundance of northwestern crows crossing the runway by grid coordinate from Runway Count data at SIT, March 1998 - March 1999.

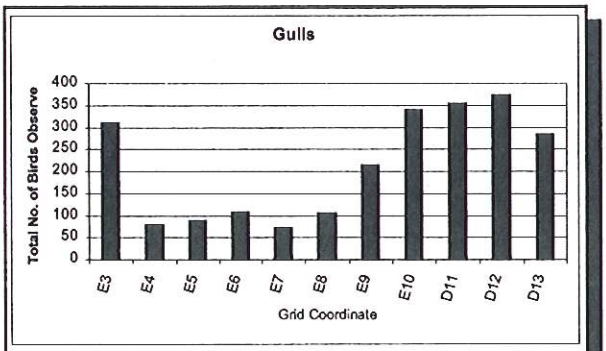


Figure 27. Total abundance of gulls crossing the runway by grid coordinate from Runway Count data at SIT, March 1998 - March 1999.

loafing in specific airfield cover types, ground cover adjacent to runway probably does influence the crossing location.

Several observations of groups of six to seven eagles circling over the runway at D11 were responsible for the corresponding peak in eagle numbers as illustrated in Figure 24. This spike is probably not an indication of a particular attractant at this runway location but rather random variation in the occurrence of birds over the runway. Although bald eagle usage was fairly evenly distributed along the runway, general observations indicate higher eagle occurrence at the east end of the runway on Volga and Fritz Islands. This activity was largely attributable to a pair of adult eagles that nested at C7 and spent many hours loafing at D13 on rocky islands and fishing in the adjacent marine waters.

Common ravens (Figure 25) and Northwestern crows (Figure 26) were most frequently observed crossing the runway at midfield. The majority of these birds were crossing the runway to feed in the intertidal areas and grass infields.

Gulls were most frequently observed crossing the east half of the runway. The east (on both the south and north sides) half of Runway 29/11 is surrounded by the most water (the northwest portion of the runway is adjacent to land). This may favor the overflights of gulls which prefer open water for feeding and sometimes loafing. Although Figure 27 shows a marked difference in the usage of the runway by gulls, specifically, more birds crossing the eastern portion, gulls may be heavy at certain times of the year on the western end, due to herring spawn or other seasonal attractants.

6.4 Near-shore Surveys

Near-shore survey data was analyzed for correlations between tides and bird activity. No significant statistical correlations could be determined. The tide, however, does significantly influence the availability of food items in the intertidal zone for birds such as crows, ravens, and shorebirds. These three species were not normally counted on Near-shore Surveys however. Incoming tides also influence the presence of spawning salmon and herring. Gulls were the most abundant and frequently seen species during Near-shore Surveys.

In addition to gulls, several species of diving ducks were seen adjacent to the runway in large flocks throughout the year. White-winged scoters (*Melanitta fusca*), surf scoters (*Melanitta perspicillata*), pelagic cormorants (*Phalacrocorax pelagicus*), and double-crested cormorants (*Phalacrocorax auritus*) were seen in adjacent marine waters in flocks of 30 or more. Both species of scoters are probably attracted to beds of Pacific blue mussels (*Mytilus trossulus*) which appear to be common in nearby waters. Cormorants are diving birds which consume mostly fish. Although both species usually stay close to the water when flying, they do have the potential to cause damage if they should cross the runway. Cormorants were periodically observed crossing both the west and east ends of the runway. Several loafing areas were identified during these surveys which appear to attract large numbers of cormorants and gulls. Nepovorotni Rocks, located approximately ¼ mile south of the runway and east of the causeway (Appendix 15), and the small rocks islands approximately 100 yards south of the runway situated in Whiting Harbor (Appendix 15), were both frequently used by loafing and roosting gulls and cormorants.

Several other species of diving ducks including oldsquaw (*Clangula hyemalis*), harlequin ducks (*Histrionicus histrionicus*), and bufflehead were observed frequently in adjacent marine waters but in small numbers. Bufflehead were also seen feeding and loafing in the tidal pond at D9 (Appendix 15), as well as open marine waters. This increases their possibility of being involved in a wildlife strike due to their crossing of the runway between the tidal pond and ocean.

6.5 General Observations

General observations provided very useful data that was not collected during other surveys. Many habitat characteristics on the airfield (e.g., food, water, and cover) attract wildlife on an intermittent

basis; either seasonally, at certain times of the day, or during periods of heavy rainfall. Due to the intermittent abundance and frequency of these wildlife occurrences, time specific surveys were not adequate to document these potential wildlife hazards. General observations (which are not constrained by time of day) were extremely useful to further document wildlife hazards at SIT.

On several instances both gulls and ravens were seen dropping items on the runway while foraging. These items include mostly intertidal invertebrates such as molluscs (i.e. clams, scallops, and mussels) and echinoderms (i.e. sea urchins). Gulls and ravens will use the paved surface to crack open these hard shelled animals in order to procure the meat inside. The shelled remains from these runway foraging bouts are left on the runway, sometimes creating a considerable FOD (foreign object debris) hazard for aircraft. Additionally, the "hovering and feeding" behavior increases these birds' chances of being struck by aircraft because of the increased time they spend on or over the runway.

Several species of Raptors, including the American kestrel (*Falco sparverius*), merlin, and peregrine falcon, were infrequently observed loafing or foraging on the airfield. Raptor species, although comprising less than 1% of the total number of birds observed on Standardized surveys (Figure 6), pose a real threat to aircraft safety due to their loafing and foraging behavior on or over the runway. These birds, when present on the airfield, spent a great deal of time perching on runway lights and flying back and forth across the runway, therefore increasing their chances of being struck by an aircraft. Raptors have been identified as one of the most commonly struck bird groups nationwide (Cleary et. al. 1997). The strike rate involving Raptors may exceed that of other more abundant groups at SIT such as Corvids (crows and ravens) and Shorebirds (sandpipers and plovers) because of the propensity of Raptors to hover and soar.

Puddles of temporary standing water in infield areas and on paved surfaces provide many bird species with an easily accessible source of fresh water for bathing, drinking, and feeding. These puddles are created in areas where drainage is inadequate such as tall grass areas around the LDA (on the south side of the runway) and directly east of Taxiway B. Other wet depressions occur throughout the airfield as well, and can usually be identified shortly after a period of heavy rain. The infield area bordered by the ramp, runway, and Taxiways A and B, contains several low areas that fill with water during rainy days. These puddles were consistent attractants for flocks of dabbling ducks, shorebirds, and several species of scavengers.

Several large flocks of migrating birds were seen in the spring and fall, either passing directly over the airfield or within several miles of the airport. Flocks of 75 Canada geese, 50 snow geese (*Chen caerulescens*), and several smaller flocks of dabbling ducks were seen flying at altitudes from 200 to 1,000 ft. These large flocks of migrating birds pose a great hazard to jet aircraft on approach or departure, and also to small aircraft transiting the area.

An interesting seasonal aspect of wildlife hazards presented itself on the airfield from mid-August through the first weeks of October. During this time, mixed flocks of shorebirds appeared on the airfield during their southward fall migration. These birds, which included several species of sandpipers and plovers, were most abundant during and after periods of heavy rain. As grassy areas

became flooded by the rain, worms and other invertebrates came to the surface of the ground, which in turn attracted birds. This source of food, albeit short-term, was a significant attractant for birds and probably contributed to the wildlife strikes in August and September.

Although Runway Count data did not reveal a correlation between weather and wildlife activity, weather was observed to play a role in bird activity, particularly with regards to shorebirds. Weather also affects the seasonal migration of birds that appear during the spring and fall months (WS 1998). Periods of severe weather (particularly high winds) may have been responsible for the sightings of Fork-tailed Storm-Petrels (*Oceanodroma furcata*), which are normally pelagic. These birds are known to breed on Saint Lazaria Island (Armstrong 1990).

Bald eagles were seen almost daily at SIT. The presence of a nesting pair of adult eagles just north of airport property was responsible for this relatively high frequency of sightings. This pair of eagles spent a great deal of time loafing in the armor rock adjacent to the runway safety area. Specific locations which were frequented include Volga and Fritz Islands and the FAA antennae array located at the LDA area on the south side of the runway at mid-field. Bald eagles were also seen taking dead grass from infield areas to the nest site. Eagles were also attracted to puddles of temporary standing water on the airfield for the purpose of drinking and bathing.

6.6 Nest Searches

The presence of nesting birds on or in the near vicinity of an airport is a concern because:

- Pre-nesting courtship behaviors for some species involve aerial displays that increase their chances of being struck by an aircraft.
- Nesting adults often spend a great deal of time around the runway environment when brooding a clutch of eggs. These same adults may increase their local flights once young have hatched, in order to find food.
- Juvenile fledglings pose an increased risk for bird strikes due to their inability to fly well and/or quickly avoid an aircraft.
- Juvenile and immature birds may pose an increased risk of collision due to their lack of experience with dealing with fast moving aircraft. They have not yet learned to recognize aircraft as something which should be avoided.

Nest searches, which were conducted once during the spring in infield grass areas, revealed the possible presence of nesting savannah (*Passerculus sandwichensis*) and Lincoln's sparrows (*Melospiza lincolnii*) throughout these areas. Although no nests were found, both these species were frequently observed throughout the spring in both tall grass and shrub areas on the airfield. The presence of territorial singing males makes the probability of nesting likely. However, due to their small body mass and tendency to form small, loose flocks, the nesting of these birds on the airfield does not indicate a direct need for habitat modification.

Two other species were documented as nesting on, or in the immediate vicinity of the airfield. One brood of killdeer (*Charadrius lapponicus*) was found in the gravel area at D7. Killdeer are a

medium-size plover which nest in open areas which have a substrate of gravel, pebbles, and sometimes little or no vegetation (Ehrlich et. al. 1988). Areas of gravel along runways or in adjacent areas can be expected to provide adequate substrate for nesting killdeer. A bald eagle nest was found at C7 in the spruce/hemlock stand directly north of Airport road and adjacent to the Coast Guard housing area. This nest is located about 20 feet from the top of a mature Sitka Spruce adjacent to a footpath which runs through the woods parallel to Airport road. The eagle pair in this nest produced two young which survived to fledge (safely depart the nest). Ownership of this property is believed to be by the AK State Department of Education.

6.7 Raven/crow Food Analysis

Common ravens and northwestern crows are omnivores that feed on a wide variety of items including carrion, small vertebrates, bird eggs and nestlings, insects, marine invertebrates, garbage, seeds, and fruit (Ehrlich et. al. 1988, O'Clair and O'Clair 1998). Their feeding strategy varies from that of a scavenger to a predator. In some situations both ravens and crows can become pests when habituated to landfills, dumpsters, or other human-provided food sources. On an airport these attractants will generally increase the amount of crow and raven activity. Birds that may have once been shy of human presence or easy to haze will become harder to deter with non-lethal control methods, often resulting in the need for lethal control of habituated birds.

It was therefore important to assess the food habits of ravens and crows using the airport. Eleven common ravens and four northwestern crows were taken during the course of the WHA by airport personnel during wildlife control operations (all birds were taken for the purpose of removing a threat to aircraft safety and not for the purpose of crop/gizzard analysis). The crop and gizzard of each of these birds was removed and the contents examined. Not surprisingly, both crows and ravens were found to be eating a wide variety of both plant and animal matter. Only one crow was found with food in it's digestive tract that is not naturally occurring in Sitka. This one crow had consumed whole kernel corn. The remaining food items consumed by crows and ravens included the following: fish (and fish eggs), crustaceans, molluscs, insects, vegetation, and berries (both salmonberries and mountain ash berries were identified).

The majority of food items appeared to be animals common in the intertidal zones adjacent to the runway. These animals, which include clams, mussels, barnacles, crabs, snails, and limpets as well as small fish and fish eggs, become available twice a day during normal ebb tides. The availability of food in the intertidal zone can not be easily modified. Due to this fact, WS does not recommend any habitat modifications involving the marine environment. Crows and ravens do not appear to be feeding heavily on garbage or other human provided food sources at SIT. However, several observations of ravens feeding out of dumpsters on airport property were made.

6.8 Off-site Wildlife Attractants

6.8a Man-made Attractants

The FAA has issued an Advisory Circular (150/5200-33) regarding *Hazardous Wildlife Attractants On Or Near Airports* (Appendix 16). 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 statute miles is recommended if the attractant may cause hazardous wildlife movement into or across the approach or departure airspace. Advisory Circular 150/5200-33 specifically identifies the underwater discharge of fish processing offal as a land use that is incompatible with safe airport operations.

The Sitka Channel, also called Sitka Harbor, located approximately ¾ mile northeast of Runway 29/11, frequently attracts large numbers of gulls and smaller numbers of both diving ducks and bald eagles. Fish waste from seafood processing activities located along the channel appears to be the primary attractant for gulls. This waste includes discharge from underwater pipes, miscellaneous waste generated during open dockside transfer and cleaning operations, and fish remains from sport fish cleaning throughout the harbor. Other attractants for gulls, as well as ravens and crows, are open dumpsters in town and the feeding of birds by people at various locations, including the McDonald's fast food restaurant and various city parks. Specific observations of bird activity in the Sitka Channel were made. Large flocks (greater than 100 individuals) of mixed gull species feeding directly above the seafood waste outfall pipes of Seafood Producers Cold Storage and Sitka Sound Seafoods were recorded.

These waste outfall pipes empty into the Sitka Channel approximately 200 yards out from the dock area of the processors. Pipe openings are located on the bottom of the channel. The nature of the seafood waste outfall consists mainly of water with chunks of fish waste that have been ground to ½ inch. Some of this fish waste floats to the surface of the water where it becomes available to scavenging birds such as gulls. Fish waste particles, which may include entrails, are probably high in oils which make them less dense than water. The discharge of large amounts of fish waste at these point sources provides an easily obtained food attractant for gulls. Observations made during the WHA support the contention that gull movements over the airport are most likely influenced by this attractant.

Meetings between the SIT Airport Manager, WS personnel, and plant managers of two of the seafood processing facilities located on the Sitka Channel were held. The results of these meetings were encouraging. Seafood plant managers were informed of the current and past bird problems at SIT, specifically with gull strikes. The probable link between gull overflights and the seafood waste discharge was discussed openly. Several possible remedies were discussed including night dumping and a possible increase in fish waste composting. WS encourages similar open discussions between AKDOT and all concerned parties concerning wildlife attractants in the vicinity of the airport. It is our experience that open exchanges of information early in the process can make solutions that involve multiple groups easier to develop.

The exact relationship between seafood waste discharge, as well as other food attractants in the Sitka Channel, and gull overflights at SIT is not fully known. Although this point-source food attractant does attract large numbers of feeding gulls on a regular basis, other food sources in the vicinity may play an important role in influencing local movements of gulls. Further study is needed to document these relationships and how they affect the overflights of gulls on the SIT runway. Possible alternatives to current fish waste disposal in the channel should also be studied to judge the efficacy on gull activity. Research wildlife biologists with the National Wildlife Research Center (NWRC) conduct wildlife damage ecology studies and research methods for reducing wildlife damage. This often involves trial studies of new technologies and methods for reducing wildlife damage. Biologists with NWRC can be contacted to discuss the possibility of further research regarding this issue.

Advisory Circular 150/5200-33 also identifies wastewater treatment facilities as a land use incompatible with safe airport operations. A wastewater treatment facility is located approximately 1,000 feet north of the SIT runway at C9 (Appendix 15). This facility does have a small open water treatment area adjacent to the main building. However, this open water area was not observed attracting any hazardous wildlife during the course of WHA. Due to its small size and the availability of more suitable wildlife habitat nearby, this facility does not appear to be a significant attractant. Caution should be exercised when planning any expansion regarding this facility. The FAA recommends against new facilities at this location that may include settling ponds.

An aquaculture operation located in Whiting Harbor at F8 was also an area of concern. This operation consists of a small oyster farm just offshore of the causeway. Although aquaculture operations are not specifically identified in the FAA Advisory Circular 150/5200-33, certain aquaculture operations are known attractants for hazardous wildlife. The oyster farm was monitored throughout the WHA and was not observed to be a food attractant for hazardous wildlife. Some species of birds (e.g., gulls and diving ducks) infrequently used the floating oyster platforms as loafing and roosting sites. This use of the floating platforms by loafing and roosting birds was not deemed a significant attractant due to the large amount of other suitable rocks and islands for bird loafing and roosting. Removal of these floating platforms is likely to have little affect on bird use in the vicinity of the runway. Any alteration or expansion of this facility that would increase the amount of potential platform roosting space or make the oysters more accessible to wildlife, particularly river otters, is not recommended.

6.8b Natural Attractants

There are numerous natural attractants within a five mile vicinity of SIT that influence the number and activity of wildlife species in the area. Populations of spawning fish such as salmon and herring provide seasonal attractants for animals such as gulls, eagles, and otters. It is the spawn of the Pacific herring, however, which is of greatest concern for SIT managers. The Pacific herring is a small saltwater fish normally up to nine inches long that migrates in schools and spawn in shallow, vegetated areas in the intertidal and subtidal zones (ADF&G 1994). It is an important part of the local commercial fishery. Spawning consists of females which deposit eggs in the water which then adheres to algae, seagrasses, barnacles and rocks (O'Clair and O'Clair 1998) followed by the release

of milt (sperm) by males which fertilize the eggs. Eggs hatch approximately two weeks later. The release of milt, which turns the water cloudy, is a recognizable sign of spawning.

Several aspects of the herring spawn attract large numbers of eagles, gulls, crows, and diving ducks. As schools of herring first appear in adjacent waters, large numbers of the fish may be seen "boiling" at the surface. This was observed to attract up to 500 gulls and 200 bald eagles at a time. Large flocks of birds were common off the ends and directly adjacent to the runway during these times. The probability of a bird strike during this event is greatly increased due to the number of birds and the fact that they become distracted when feeding. The eggs themselves provide an increased attractant to gulls, ravens, and crows as they drift onto the shoreline in windrows and become exposed on rocks during low tide. These windrows of eggs were particularly abundant on the small gravel beaches located at grids E2, E6, and D11 (Appendix 8). The number of egg masses appeared particularly heavy in Whiting Harbor. During the hatching period, young herring are then an attractant to gulls and diving ducks. The herring spawn at SIT usually takes place from mid-March through April. During the herring spawn, it is important that wildlife control personnel "pick-up the pace" of hazing efforts and employ a wide variety of techniques to prevent habituation.

Figure 28. Photo illustrates spawning herring in the channel adjacent to SIT's runway. The water is cloudy water due to the release of milt.

Figure 29. Photo illustrates a small concentration of gulls over the channel adjacent to SIT's runway. Bird concentrations much heavier than this are common near the outfalls to fish processing plants, during salmon runs, and when herring are spawning.

Local runs of salmon provide an increased attractant to bald eagles, gulls, and ravens. The pink salmon (*Oncorhychus gorbuscha*) run at Indian River, located in the Sitka National Historic Park, attracted large numbers of gulls. Several thousand gulls were observed

roosting and loafing at low tide along the shoreline and mouth of the Indian River in the Sitka National Historic Park. The breakwater at the northwest end of the Sitka Channel was also a frequent loafing site for gulls and eagles. Other loafing areas include the causeway islands to the south of the runway.

7.0 Recommendations

Recommendations for managing wildlife hazards at SIT have been divided into four sections:

- ***General***
- ***Habitat Management***
- ***Wildlife Deterrence Methods***
- ***Species Treatments***

Alterations to habitat will have the most lasting effect on reducing the use of the airport by hazardous wildlife. Wildlife deterrence methods are used to deal specifically with individual animals or groups of animals. The Species Treatments section provides a quick list of techniques that can be used to manage species identified as critical during the study, but the list is by no means comprehensive of all techniques.

7.1 General Recommendations

Assign or Hire Full-Time Wildlife Control Personnel

The wildlife hazards at SIT occur with enough frequency and are of such a diverse nature as to require the attention of a full-time wildlife control person. Current wildlife control efforts have been sufficient to keep the number of wildlife strikes lower than would occur otherwise. However, the persistence of many birds on the airfield is partly a function of the limited hours currently being devoted to active bird deterrence. More frequent control efforts, the institution of habitat modification recommendations, and the ongoing documentation of wildlife control efforts and wildlife activity, all require personnel whose duties are solely devoted to these tasks. WS feels that this can be accomplished with the assignment of one person whose duties and responsibilities include the following:

- Updating and annually revising the WHMP based on this WHA and future wildlife observations.
- Obtaining the appropriate wildlife control permits and supplies.
- Ensuring that SIT personnel and pilots are familiar with the proper procedures for reporting all types of wildlife strikes, and to make the FAA Form 5200-7 readily available. Whenever possible, this person should try to file all wildlife strike reports personally, to ensure accuracy in species identification and other crucial information.
- Maintaining a database for wildlife hazard management activities, as well as wildlife strike information collected from pilot reports, mechanical inspections, and runway sweeps.

- Making arrangements for the proper instruction of SIT personnel who will assist in the implementation of wildlife hazard management.
- Maintaining cooperative relationships with appropriate wildlife resource management agencies (e.g., USFWS, WS, ADF&G, and USFS). Such relationships will provide the airport with ongoing biological expertise.

Wildlife control personnel should actively participate in land-use projects or changes, on or off airport property that could increase wildlife hazards at SIT. For example, new buildings should be designed in a manner that discourages use by wildlife. Companies that produce refuse should be encouraged to use disposal methods that are not attractive to wildlife. Mitigation projects to restore wildlife habitat for potentially hazardous species should be sited as far as possible from the airfield's critical zone.

Update the Current Wildlife Hazard Management Plan Based on the WHA

The current Wildlife Hazard Management Plan (WHMP) should be updated using this WHA. The plan should include sections on habitat management, resources, training, and evaluation, in addition to the sections already contained in the plan. The habitat management section should include a timetable outlining wildlife habitat management goals and projected completion dates. The wildlife control procedures should include species specific techniques for deterrence. Wildlife control procedures should include all groups of hazardous wildlife such as shorebirds and waterfowl. These procedures should set guidelines for the appropriate and most effective use of lethal control methods. An outline for a WHMP is provided in Appendix 17 of this document. Because airports are dynamic environments, the plan should be revisited at least annually to determine if changes are necessary and to consider how the wildlife control program can be improved or modified.

Adopt a Policy of Zero Tolerance Toward Hazardous Wildlife

One of the most important aspects of any wildlife control program is the recognition of wildlife hazards. The idea that some species are less of a problem based on perceptions of their behavior can lull airport management into playing a "numbers" game with regards to the probability of wildlife strikes. Therefore, a policy of zero tolerance on the airfield should be adopted toward all potentially hazardous wildlife, including shorebirds and waterfowl. Any bird observed by airport personnel on the airfield can be considered hazardous because any bird could potentially fly over the runway. Wildlife control activities should focus on "key species" identified in the **Results and Discussion** (Section 6) when logistical constraints for hazing wildlife become a factor.

Update Current Wildlife Hazard Report Log and Reporting Procedures

The daily wildlife hazard report logs and procedures should be updated to include the following when recording wildlife control activities:

- Only one column is needed for the wildlife species observed, not one for wildlife and one for birds. Report the wildlife species using the animal's "common name" as identified using up-to-date field guides.
- Include only one column for the "number of animals" observed or controlled during an action. This makes data summaries easier to compile at year's end.
- Include a column for recording the "method" used during the control action (e.g., pyrotechnics, shooting). This will allow wildlife control personnel to judge the efficacy of various techniques for deterring wildlife.
- Include a "Comments"section which allows personnel to add any pertinent information such as the animal's reaction to the control effort or age, sex, and plumage characteristics that may help in proper species identification.
- Runway sweeps during which no wildlife is observed should also be included in wildlife hazard reporting. Although this is the current procedure, WS cannot overemphasize the importance of recording a tally of "0" when no wildlife is observed. This will help airport management document wildlife activity or the lack thereof in the event of a liability question.

A sample Wildlife Hazard Control Data Sheet which incorporates these elements is included in Appendix 18.

Issue Special NOTAMs During Times of Highest Bird Activity

Through a series of civil suits, the courts have established that a Notice to Airmen (NOTAM - FAA Advisory Circular 150/5200-28) is an acceptable mechanism for disseminating information regarding wildlife hazards within an airfield environment. Issuing a standing NOTAM that states bird hazards are present in the vicinity of the airfield throughout the year is too general and is not recommended at SIT. To be of benefit to pilots, a NOTAM, should be somewhat site and time specific.

Flocks of migrating birds such as sandhill cranes, snow geese, and other waterfowl may not use the airfield directly and therefore cannot be excluded from flying over it. A special NOTAM issued to the proper Air Traffic Control authority (Sitka Radio) detailing the species involved, 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 ft.). Special NOTAMs concerning large flocks of feeding birds (particularly during herring spawn) adjacent to the runway would also be useful. These observed "peaks" in bird migration and activity usually last only several days and in some instances may only occur during certain times of the day. The NOTAM should be issued upon observation of these large flocks and canceled when the threat is considered to have subsided. A NOTAM can also be issued if birds are expected in the area such as the spring and fall migration periods. The issuance of a special NOTAM concerning these flocks would serve as a supplement to the airport remarks found in the Airport Facility Directory (AFD) which states: "Large flocks of migratory birds on and in vicinity of arpt." (U.S. Dept. of Comm. 1998). These special NOTAMs would give pilots a "heads up" about the special nature of the

wildlife hazard. Issuance of NOTAMs should be the responsibility of the wildlife control person, working in concert with the airport manager.

Communicate to the Community the Need for Reduction in Food Waste Attractants

The airport should take seps to alert the public that the feeding of gulls, ravens, and crows, either intentionally or unintentionally, can contribute to bird hazards at the airport by making birds acclimated to human presence and influencing bird movements across the runway. Birds that have become accustomed to feeding out of dumpsters or being hand fed by people are more difficult to deter from the airport using non-lethal methods. The city of Sitka should be advised to take steps to educate users of public parks and boat harbors that feeding birds may contribute to bird hazards at the airport. The use of signs in public parks and/or distribution of information via local media sources might increase the public's awareness of this issue. In addition, businesses that use outdoor containers (e.g dumpsters) for disposal of food waste should be encouraged to keep these containers securely closed at all times to prevent access by scavenging wildlife.

The McDonald's Restaurant located at 913 Halibut Point Rd. should be informed that patrons frequently feed gulls on the lawn adjacent to the water. In addition, overflowing trash receptacles provide an easily obtained food source for gulls and ravens. They should be encouraged to properly secure all trash and discourage the feeding of birds. The airport should continue to work with the seafood processing facilities located on the Sitka Channel. The WHMP should give prominence to working with seafood processors to develop ways to reduce the amount of seafood processing waste that is made available to scavenging birds in the Sitka Channel. This may include the further study of methods to reduce waste and the relationships to gull overflights at the SIT runway.

This recommendation is not intended to single out any one group responsible for creating food waste attractants. Specific mentions of areas or businesses are based on limited observations conducted off airport property during the WHA. WS recognizes that the acclimation of scavenging birds to human provided food sources is most likely a community wide problem.

Consider Using a Computer Database for Record Keeping

To assist airports with the compilation and interpretation of wildlife hazing/control data, Wildlife Services has developed the WHMIS database. WHMIS can be provided free of charge, but requires a computer with Windows 95 or higher and Microsoft Access 97 to operate. Once set up, the database system can be operated by personnel with little or no previous computer training. Employees can enter their own hazing data and print out reports or analyze trends quickly. Contact Corey Rossi (Supervisor for the WS Alaska District and one of the system's primary developers) in our Palmer office at (907) 745-0871 if you have any questions or would like to request a copy of the database system.

Continue Monitoring Wildlife Activity and Use Patterns on the Airfield

The intent of this Wildlife Hazard Assessment has been to document general occurrence, land-use patterns, and population characteristics of wildlife at the Sitka Rocky Gutierrez Airport. Attempts were also made to identify significant attractions within a 5-mile radius of the airfield that could adversely affect the safety of pilots and their passengers. It should be realized that wildlife abundance and use patterns on airfields are affected by a host of variables that are rarely the same from year-to-year. Hence, conclusions based on wildlife activity and patterns during this study are only meant to be a guide and may or may not be consistent with subsequent years. Survey routes and methods were established in a manner to facilitate continued monitoring by an individual trained in wildlife species identification. Data from this study will provide a baseline for comparison in subsequent years. SIT should continue to monitor wildlife activity by conducting periodic surveys at the same points used during this assessment (Appendix 12). While surveys conducted in subsequent years may not be conducted with the same frequency or intensity as this initial hazard assessment, they would still provide general insights into wildlife use patterns over time. In addition, they would enable SIT wildlife control personnel to gauge the effectiveness of their control efforts.

7.2 Habitat Management

Habitat management provides the most effective long term remedial measure for reducing wildlife hazards on or near airports. Habitat management includes the physical removal or manipulation of cover, nesting habitat, or food items that attract wildlife. The ultimate goal is to make the environment unappealing to the species posing the greatest hazards to air traffic. This is accomplished by promoting an airport environment with habitat that is monotypic (uniform) throughout. The Sitka Airport is surrounded by open marine waters that contribute heavily to the presence of wildlife on the airfield. This marine environment is not easily subject to manipulation of the factors contributing to wildlife abundance (e.g., fish populations, intertidal invertebrates). Consequently, these habitat recommendations focus on the modification of terrestrial vegetation, food sources, and temporary standing water.

When Possible, Pave or Grade Vegetated Areas

When possible, areas containing any type of vegetation should be eliminated and either paved or graded with coarse gravel. The most unattractive areas for wildlife on airfields tend to be sterile, industrial sites that are devoid of food, water, and essential cover (e.g., loafing, roosting, and/or nesting). This recommendation represents the ideal situation with regard to habitat management and should be used as a general guideline for planning purposes.

Eliminate as Much Standing Water as Possible

The removal of standing water or filling of areas that have temporary standing water should greatly reduce the number of dabbling ducks and shorebirds that utilize the airfield. In addition, removal of these water sources will help reduce the attractiveness for eagles, ravens, and crows which use puddles for bathing and drinking. Specifically, fill in all wet depressions and low lying areas that

hold water after rain. In areas where drainage is a concern, these areas should be filled with coarse gravel that would allow the draining of water but would not create open puddles that can be accessed by birds. An aerial photograph showing some of these temporary standing water areas is shown in Appendix 19. The drainage ditch that flows into the tidal pond at D7 should be converted to an underground drainage culvert. This area was used frequently by dabbling ducks and river otters.

The tidal pond at D8 and D9 should be drained and filled. The removal of this small water body should greatly reduce the flights of waterfowl and herons between the ocean and the tidal pond. It will help to reduce the number of gulls that use the pond for roosting when it is frozen. It may further help to reduce the attractiveness of the airfield to river otters. An interim recommendation to fill this area was made early on during the WHA.

Eliminate Shrub Cover

Areas containing alder and willow shrubs greater than two feet high should be cut. These areas provide loafing and feeding cover for flocks of passerines such as golden-crowned sparrows and European starlings. Shrubs along the tidal pond adjacent to the runway provide protective cover for waterfowl. Several of these areas contain salmonberry shrubs which are a food source for birds. Specific areas of concern are the shrubs inside the fence at the mausoleum at D10, along the tidal pond at D8-D10 and surrounding the drainage ditch at D7. The removal of these shrubs will help to create an airport environment that is monotypic.

Ensure Proper Food Refuse Containment on Airport Property

Ensure the continued proper containment of food refuse in dumpsters and other receptacles on airport property. Although birds were seen feeding in dumpsters on only a few occasions, it is a problem that could provide a substantial food attractant for scavenging birds. Encourage other facilities and groups on Japonski Island (e.g., U.S. Coast Gaurd, SEARHC Hospital, Mt. Edgecumbe High School) to do the same.

Dispose of all Animal Carcasses Immediately

It is important not to attract scavenging wildlife such as eagles, ravens, crows, and mink. Dispose of all animal carcasses (whether taken during wildlife control operations or simply naturally occurring carcasses) immediately. Carcasses should not be thrown into the ocean to let the tide take care of them, but should be disposed of in plastic bags and put in a tightly covered dumpster. Carcasses will often float for a long period of time creating an attractant for scavenging wildlife. Specifically, do not add bird carcasses to the airport environment as a result of wildlife control efforts. When using lethal control to haze bird flocks, only take birds that can easily be retrieved. It is counterproductive to shoot birds over water or the armor rock only to have them fall in the water or into the rocks where they cannot be retrieved. On numerous occasions, bald eagles were seen feeding on these carcasses. The attraction of hazardous scavenging birds to the runway environment creates an additional hazard to aircraft safety.

Remove Potential Bald Eagle Nest Trees on Causeway Islands

As discussed in Section 6.6, nesting of birds on airport property is undesirable for a number of reasons. Bald eagles can be discouraged from nesting on the causeway islands by removing potential nest trees. Bald eagles in southeast Alaska usually nest in mature Sitka spruce, (*Picea sitchensis*) adjacent to the water. Nest trees are often the largest in the stand, have sparse tree cover around and above the nest, and afford a good view of the surrounding area. Removal of trees fitting these characteristics from the causeway islands will help to reduce the attractiveness of this habitat to nesting eagles. This recommendation applies only to trees that do not currently contain a nest. Trees that currently have either an active or inactive bald eagle nest cannot be disturbed or destroyed per the Bald and Golden Eagle Protection Act.

Discourage Nesting of Plovers in Gravel Areas

Areas of the airfield that have open gravel or gravel with sparse vegetation should be dragged at least twice a month from April - May. This could be accomplished using a grader or tractor with mowing attachment. The idea is to disturb ground nesting plovers, such as killdeer, during the initial process of egg-laying and nest building. Frequent disturbance of the gravel substrate during the spring should be enough to either prevent birds from laying eggs in the first place or destroy eggs that have been recently layed. Under the Migratory Bird Treaty Act, this would constitute a lethal take if eggs are destroyed, and would therefore, require an annual depredation permit issued by the USFWS.

7.3 Wildlife Deterrence

A variety of methods are available for managing hazardous wildlife species found on and around SIT. Refer to Hygnstrom et al. (1994) for a detailed and comprehensive two-volume manual of prevention and control of wildlife damage. The following wildlife deterrent recommendations represent only possible solutions to the problems observed at SIT and are based on WS experience with managing wildlife hazards at airports in Alaska. Techniques used by airports outside Alaska may also provide some effectiveness for managing wildlife hazards at SIT. WS encourages the trial of other techniques, particularly non-lethal methods, for eliminating wildlife hazards. It is important to remember that a little imagination and persistence greatly augments the efficacy of any wildlife hazard reduction measure.

Expand Hazing of Wildlife to Include All Hours of Operation

All hazardous wildlife should be hazed from the field whenever observed. This includes hours of operation during which there are no air carrier operations. This will help reinforce the "zero-tolerance" zone and policy towards wildlife. Birds in particular can habituate to periods of relative safety (hours when they are not hazed), thus becoming more difficult to deter on a long term basis. Searches for wildlife should be extended up to the last possible moment before landing and departure because flocks of birds can land immediately before an aircraft arrives or departs.

Haze Early and Consistently

All birds should be hazed from the airport in the early morning. If birds are consistently chased each morning before they have a chance to feed, they will find alternative food sources and will be less apt to return later in the day. If this policy is consistently maintained, they will soon learn to avoid the airfield altogether. Once birds become established in the area, they will become increasingly difficult to disperse, especially if they begin nesting. Flocking birds such as waterfowl, gulls, and shorebirds are readily attracted to individuals or flocks of birds already present, resulting in a dramatic increase in the number of birds on the airport in a short period of time. To prevent this decoying effect, all birds should be dispersed from the airfield immediately upon their arrival and not allowed to nest, feed, or loaf.

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

Lethal control should be used to control birds that do not respond to other methods, especially gulls, waterfowl, ravens, and crows. Lethal control of shorebirds (e.g., plovers and sandpipers) is typically less effective and should be used only in situations where they pose an immediate hazard to aircraft safety. It should be noted that when shooting gulls, it is not uncommon for the remaining birds to concentrate around the downed birds in a circling formation as they investigate. Therefore, shooting should not be conducted if an aircraft is on final approach or is departing immediately, unless it is a flock of three birds or less. The following guidelines should be followed when using lethal control:

- Use lethal control only as reinforcement for other non-lethal deterrent methods such as pyrotechnics and vehicle hazing, or as a last effort to remove persistent individuals from a flock. The removal of one or two individuals from a flock of birds generally has the same negative conditioning effect on remaining birds as the removal of 10 - 15 birds from the same flock.
- The use of lethal control on the airport, as a method for reducing the local population of hazardous bird species, is not an effective strategy for reducing hazards at SIT. The number of birds that pass over the airport at any given time are probably only a small percentage of the total population. Lethal control would have to be carried out on a much larger geographic area to reduce the total population of local birds to a level that is detected on the airfield. Lethal control of birds on a much larger geographic scale is not recommended at this time.
- Lethal control of individuals from migrating species (e.g., shorebirds and white-fronted geese) may not significantly reduce the number of birds landing on the airfield. Negative response conditioning will not affect birds that have never experienced the conditioning technique. During migration different individuals will likely be encountered on a day to day basis. Birds that were harassed the day before with a shotgun may not be the same ones observed the next day.
- Lethal shooting of flocking birds should always be accompanied by a non-lethal control method (e.g., pyrotechnics, vehicle hazing).

The issue of public sensitivity to lethal control should be considered, and discretion is advised. However, concerns over public sensitivity should not supersede those of public safety, and the airport should not hesitate to implement lethal control when the situation warrants such action.

Use Multiple Types of Pyrotechnic Devices

It is necessary to use a diversity of pyrotechnic devices when hazing birds. Whistlers, bangers, and crackershells should all be kept on hand during wildlife control operations. Birds can quickly habituate to one type of stimulus and should therefore be deterred with multiple types of pyrotechnics as often as possible. Try to keep on hand pyrotechnics that can be used at a variety of distances. Thirty-seven millimeter rounds have a longer range and louder bang than the crackershells that are currently being used. These might prove more effective on bird flocks that are consistently "just out of range". However, the cost per round is considerably higher, so judicious use of these particular pyrotechnics is advised. A list of suppliers of pyrotechnic devices, as well as other deterrent devices, is provided in Appendix 20.

Use Propane Cannons at Hot Spots During Herring Spawn and Other High Activity Events

The use of propane gas exploders (cannons) can be an effective compliment to the regular hazing of wildlife. The airport currently has several propane cannons that can be used for this purpose. Propane cannons should be placed along the shoreline in areas where bird concentration is highest. The use of cannons should only be considered a supplement to an active hazing program. Many birds will habituate to the sound of a cannon if not backed up with other deterrent methods. It will be necessary to frequently (at least daily) change the location of cannons and also the firing timing to prevent acclimation. A list of suppliers of gas exploders is provided in Appendix 20.

Consider Using Overhead Wire Grids on Permanent Water Sources to Exclude Birds

The ideal situation with water sources is to first attempt to drain and fill them. If this cannot be accomplished due to wetlands regulations or storm water detention/treatment, then exclusionary techniques should be considered. Various applications of overhead wire grid systems to exclude birds from water have been demonstrated to be successful. Their efficacy depends on the species and situation. The design of the grid (e.g., spacing between wires, height above water) is determined by the type of birds being targeted. The design of a grid system, particularly for the tidal pond, should consider the exclusion of waterfowl, eagles, gulls, and herons. Wire grids can also be used successfully across drainage ditches and other attractants (e.g., landfills). WS has expertise in designing and installing these grid systems and can be contacted if the airport needs assistance in this matter.

Use Mylar Flash-tape as a Visual Deterrent Across Drainage Ditches/Wet Areas

Mylar flash-tape strung across drainage ditches and/or wet areas can be effective in deterring waterfowl. This may prove a cheaper alternative to a wire grid system over the same areas. The mylar flash-tape, when tied to a line that crosses the water, will wave in the wind producing a visual

effect and auditory humming that many birds do not like. Materials necessary for this include wood stakes or rebar approximately 1-2 meters tall, twine or thin rope, and mylar flash-tape. Benefits of this method include the relatively cheap cost. Negative aspects of this method include frequent maintenance and the possibility of FOD being created by ripped mylar tape.

Discourage Eagle Perching/Loafing on Tall Structures

Bald eagles prefer sites that have tall perches next to water or other areas of abundant food. At SIT, several perch sites were identified that received frequent use. FAA antennae and the rotating airport beacon located on the south side of the runway at the LDA (localizer displaced array) equipment area both were frequently used by eagles. Birds should be discouraged from perching on this equipment by using porcupine attachments which are affixed to the horizontal surfaces of the structure. These attachments prevent birds from landing by using plastic or stainless steel "spikes" that protrude outward at all angles. This equipment does not harm the birds and provides a long-term, low maintenance technique for discouraging bird use on airfields. Several makers of this equipment are listed in Appendix 20. These porcupine attachments can also be used on window sills, eaves, ledges, signs, light fixtures and roof peaks. Trade names for this equipment include Nixalite and Bird-B-Gone. The FAA should be consulted prior to installation on antennae that may be subject to interference by metal objects.

Regularly Haze Offshore Flocks of Waterfowl (Dabblers & Divers)

Although offshore flocks of birds were not seen crossing the runway with as great a frequency as gulls, crows, ravens and eagles, they can still pose a threat to aircraft due to their flocking behavior and tendency to fly at low altitudes. Flocks of birds which loaf and feed, as well as single large birds which spend a great deal of time feeding (e.g., loons), in adjacent marine waters increase the likelihood of bird overflights on the runway. This in turn increases the probability of a wildlife strike. Wildlife control operations should target these flocks of birds in adjacent marine waters; including flocks of harlequin ducks, scoters, oldsquaw, and bufflehead. Whiting Harbor should be monitored in particular for concentrations of these large waterfowl flocks, and control efforts should include this area.

WS realizes that proper monitoring and control of bird activity in adjacent marine areas will in all likelihood require a boat. The purchase of a boat for offshore wildlife control operations is justified based on the existing wildlife hazards observed. A boat can be used for retrieval of bird carcasses from the water. A boat may have an ancillary benefit of being used for safety and rescue purposes. Caution should be exercised during any offshore harassment efforts not to directly disturb marine mammals. Use of nearby marine waters by marine mammals appeared to be uncommon and the presence of these animals should not, in most cases, compromise the use of deterrent techniques to enhance safety.

Target Nearby Offshore Bird Loafing/Roosting Areas

Wildlife deterrent operations should also target nearby offshore rocky islands that serve as regular loafing and roosting areas for birds. Specifically, Nepovorotni Rocks (located approximately ¼ mile south of the runway and east of the causeway) and the small rocks just 100 yards south of the runway across from the DOT maintenance building. Nepovorotni Rocks was regularly used by both gulls and cormorants while the small rocks just 100 yards south of the runway was used primarily by cormorants. Disruption of these roosting/loafing sites will help to reduce the amount of hazardous bird activity in the vicinity of the runway. Birds that are hazed from these areas may seek refuge on other rock islands and rocky shoreline further southwest on the causeway including Makhnati Island.

Trap and Remove Persistent Mammals

River otter were the only hazardous terrestrial mammals (observed during the WHA) which warrant any action. Individuals which persist on the airfield or adjacent to the runway should be removed from the airfield. Although deer were not observed on the airport during the WHA, they have created hazards on previous occasions at SIT. Deer should be removed immediately and not allowed to seek refuge in woodland areas. Note: Relocation of wildlife is generally not recommended by WS and not authorized by ADF&G. Consult ADF&G before attempting to trap or destroy hazardous mammals.

7.4 Species Treatments

Dabblers

- Reduce standing water
- Pyrotechnic hazing
- Exclude from water using overhead barriers

Divers

- Eliminate tidal pond
- Exclude from water using overhead barriers
- Pyrotechnic hazing (offshore as well)

Fish-eaters

- Eliminate tidal pond
- Exclude from water using overhead barriers
- Pyrotechnic hazing

Gulls

- Pyrotechnic hazing (offshore as well)
- Propane cannons

Insectivores

- ✈ Remove shrub cover
- ✈ Pyrotechnic hazing

Raptors

- ✈ Pyrotechnic hazing
- ✈ Remove shrub cover

Scavengers

- ✈ Reduce number of animal carcasses and available trash on airfield
- ✈ Pyrotechnic hazing
- ✈ Exclude from common perching sites

Shorebirds

- ✈ Eliminate temporary standing water
- ✈ Pyrotechnic hazing

Songbirds

- ✈ Remove shrub cover

Mammals

- ✈ Pyrotechnic hazing
- ✈ Trapping and removal of persistent individuals

8.0 Literature Cited

The following sources of literature were cited directly in this assessment. In addition to these sources of information, WS also relied upon the knowledge of Sitka DOT employees and local wildlife professionals with regards to local wildlife. A list of internet addresses is included in Appendix 21 which provides further sources of information regarding wildlife hazards at airports.

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APPENDIX 1 *(1 page)*

CODES OF FEDERAL REGULATIONS - AVIATION

CFR 14 - PART 139.337 (Wildlife Hazard Management).

(a) Each certificate holder (*holder of the airport operating certificate*) shall provide for the conduct of an ecological study, acceptable to the Administrator (*FAA*), when any of the following events occur on or near the 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 paragraph (a)(1) or (2) of this section is observed to have access to any airport flight pattern or movement area.

(b) The study required in paragraph (a) of this section shall contain at least the following:

(1) Analysis of the events which prompted the study.

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

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

(4) Description of the wildlife hazard to air carrier operations.

(c) The study required by paragraph (a) of this section shall be submitted to the Administrator, who determines whether or not there is a need for a wildlife hazard management plan. In reaching this determination, the Administrator considers-

(1) The ecological study;

(2) The aeronautical activity at the airport;

(3) The views of the certificate holder;

(4) The views of the airport users; and

(5) Any other factors bearing on the matter of which the Administrator is aware.

(d) When the Administrator determines that a wildlife hazard management plan is needed, the certificate holder shall formulate and implement a plan using the ecological study as a basis. The plan shall-

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

(2) Provide measures to alleviate or eliminate wildlife hazards to air carrier operations.

(e) The plan shall include at least the following:

(1) The persons who have the authority and responsibility for implementing the plan.

(2) Priorities for needed habitat modification and changes in land use identified in the ecological study, with target dates for completion.

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

(4) Identification of resources to be provided by the certificate holder for implementation of the plan.

(5) Procedures to be followed during air carrier operations, including at least-

(I) Assignment of personnel responsibilities for implementing the procedures;

(ii) Conduct of physical inspections of the movement area and other areas critical to wildlife hazard management sufficiently in advance of air carrier operations to allow time for wildlife controls to be effective;

(iii) Wildlife control measures; and

(iv) Communication between the wildlife control personnel and any air traffic control tower in operation at the airport.

(6) Periodic evaluation and review of the wildlife hazard management plan for-

(I) Effectiveness in dealing with the wildlife hazard; and

(ii) Indications that the existence of the wildlife hazard, as previously described in the ecological study, should be reevaluated.

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

(f) Notwithstanding the other requirements of this section, each certificate holder shall take immediate measures to alleviate wildlife hazards whenever they are detected.

(g) FAA Advisory Circulars in the 150 series contain standards and procedures for wildlife hazard management at airports which are acceptable to the Administrator.

APPENDIX 2 *(2 Pages)* No. 12-34-71-0003-MOU

MEMORANDUM OF UNDERSTANDING
BETWEEN
UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION (FAA)
AND
UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE ANIMAL CONTROL (ADC)

ARTICLE 1

This Memorandum of Understanding (MOU) establishes a cooperative relationship between FAA and ADC for resolving animal hazards to aviation that benefits public safety.

ARTICLE 2

This MOU is reached pursuant to the Animal Damage Control Act of March 2, 1931, (7USC 426-426b), and The Rural Development, Agriculture, and Related Agencies Appropriations Act, 1988 (P.L. 100-202), which established the authority of 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 Administrator of the FAA, is empowered to issue airport operating certificates for airports serving air carrier aircraft and certifies that such airports are properly and adequately equipped, and able to conduct safe operations, pursuant to the Federal Aviation Act of 1958, (49USC 1432), as amended. Federal Aviation Regulation (14 CFR Part 139) requires certificated airports having a wildlife hazard problem to develop and implement a wildlife hazard management plan to manage and control wildlife which present a risk to public safety caused by aircraft collisions with wildlife. "Wildlife hazard" has been defined as a potential for a damaging aircraft collision with wildlife, on or near an airport.

ARTICLE 3

FAA and ADC agrees:

a. That ADC has the expertise to provide technical and operational assistance needed to reduce wildlife hazards to aviation on and near airports.

b. That most airports lack the technical expertise to identify underlying causes of wildlife hazard problems, but do have the capability to control their own wildlife, following proper instruction in control techniques.

c. That situations arise where nuisance wildlife control is necessary off airport property (roost relocations reductions in nesting populations, etc.) requiring specialized technical assistance of ADC personnel.

d. That FAA or the certificated airport may request technical and operational assistance from ADC to reduce wildlife hazards. This assistance includes, but is not limited to, site visits to identify wildlife and their movement patterns and habitats which increase the risk of animal and aviation conflicts. ADC personnel may also provide, (1) recommendations on control and habitat management to minimize the hazards, (2) training in the use of control devices, and (3) recommendations on the scope of further-studies necessary to identify and minimize wildlife hazards.

e. ADC shall not be liable or responsible for development, approval, or implementation of wildlife hazard management plans required under PAR Part 139.337, this being the responsibility of the airport operator. Information provided by ADC as a result of site visits or consultation shall be used by the airport operator in developing the wildlife hazard management plan.

f. To meet at least annually to review this agreement, identify problems exchange information on new control methodologies, identify research needs, and prioritize program needs.

ARTICLE 4

All animal damage control activities will be conducted in accordance with applicable Federal, State, and local laws and regulations. ADC personnel shall advise airport operators of their responsibilities to secure necessary permits and/or licenses for control of wildlife.

ARTICLE 5

This MOU defines in general terms, the basis on which the parties will cooperate, and does not constitute a financial obligation to serve as a basis for expenditures. Request for technical, operational, or research assistance which require cooperative or reimbursable funding will be completed under a separate agreement.

ARTICLE 6

This MOU shall supersede all existing MOU'S, supplements, and amendments relating to the conduct of animal damage control programs between ADC and FAA.

ARTICLE 7

Pursuant to Section 22, Title 41, United States Code, no member of or delegate to Congress shall be admitted to any share or part of this MOU, or to say benefit to arise therefrom.

ARTICLE 8

This MOU shall become effective upon the date of final signature and shall continue indefinitely. This Memorandum may be amended at any time by mutual agreement of the parties in writing. It may be terminated by either party upon 60 days' advance written notice to the other party.

APPENDIX 3 *(3 pages)*

FAA BIRD/WILDLIFE STRIKE REPORT FORM

Form Approved OMB NO. 2120-0045

U.S. Department of Transportation
Federal Aviation Administration

BIRD / OTHER WILDLIFE STRIKE REPORT

1. Name of Operator	2. Aircraft Make/Model	3. Engine Make/Model
4. Aircraft Registration	5. Date of Incident ____/____/____ Month Day Year	6. Local Time of Incident ☐ Dawn ☐ Dusk — HR — MIN ☐ Day ☐ Night ☐ AM ☐ PM
7. Airport Name	8. Runway Used	9. Location if En Route *(Nearest Town/Reference & State)*
10. Height *(AGL)* feet	11. Speed *(IAS)* knots	

12. Phase of Flight

- ☐ A. Parked
- ☐ B. Taxi
- ☐ C. Take-off Run
- ☐ D. Climb
- ☐ E. En Route
- ☐ F. Descent
- ☐ G. Approach
- ☐ H. Landing Roll

13. Part(s) of Aircraft Struck or Damaged

	Struck	Damaged		Struck	Damaged
A. Radome	☐	☐	H. Propeller	☐	☐
B. Windshield	☐	☐	I. Wing/Rotor	☐	☐
C. Nose	☐	☐	J. Fuselage	☐	☐
D. Engine No. 1	☐	☐	K. Landing Gear	☐	☐
E. Engine No. 2	☐	☐	L. Tail	☐	☐
F. Engine No. 3	☐	☐	M. Lights	☐	☐
G. Engine No. 4	☐	☐	N. Other: *(Specify)*	☐	☐

14. Effect on Flight

- ☐ None
- ☐ Aborted Take-Off
- ☐ Precautionary Landing
- ☐ Engines Shut Down
- ☐ Other: *(Specify)*

15. Sky Condition

- ☐ No Cloud
- ☐ Some Cloud
- ☐ Overcast

16. Precipitation

- ☐ Fog
- ☐ Rain
- ☐ Snow
- ☐ None

17. Bird/Other Wildlife Species

18. Number of birds seen and/or struck

Number of Birds	Seen	Struck
1	☐	☐
2-10	☐	☐
11-100	☐	☐
more than 100	☐	☐

19. Size of Bird(s)

- ☐ Small
- ☐ Medium
- ☐ Large

20. Pilot Warned of Birds ☐ Yes ☐ No

21. Remarks *(Describe damage, injuries and other pertinent information)*

DAMAGE / COST INFORMATION

22. Aircraft time out of service:	23. Estimated cost of repairs or replacement *(U.S. $)*:	24. Estimated other cost *(U.S. $) (e.g. loss of revenue, fuel, hotels)*:
____ hours	$	$

Reported by *(Optional)*	Title	Date

Paperwork Reduction Act Statement: The information collected on this form is necessary to allow the Federal Aviation Administration to assess the magnitude and severity of the wildlife-aircraft strike problem in the U.S. The information is used in determining the best management practices for reducing the hazard to aviation safety caused by wildlife-aircraft strikes. We estimate that it will take approximately 5 minutes to complete the form. The information collected is voluntary. Please note that an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection is 2120-0045.

FAA Form 5200-7 (11-97) Supersedes Previous Edition ☆ U.S. GPO:1997-432-349/74201 NSN: 0052-00-651-9005

U.S. Department
of Transportation

Federal Aviation Administration

800 Independence Ave., S.W.
Washington, D.C. 20591

Official Business
Penalty for Private Use, $300

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UNITED STATES

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POSTAGE WILL BE PAID BY FEDERAL AVIATION ADMINISTRATION

Federal Aviation Administration
Office of Airport Safety and Standards, AAS-310
800 Independence Avenue, SW
WASHINGTON, DC 20591

FOLD AND TAPE HERE

APPENDIX 4 *(3 Pages)*

SIT'S CURRENT WILDLIFE MANAGEMENT PLAN

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES	NAME Federal Aviation Administration SITKA ~~AAL-620~~
SOUTHEAST REGION AIRPORT CERTIFICATION MANUAL	REVISION APPROVED BY: OCT 24 1995
CHAPTER NO. AND TITLE XV. WILDLIFE HAZARD MANAGEMENT	PAGE NO: 1 of 2

A. WILDLIFE HAZARD MANAGEMENT PLAN

1. Enforcement

All factors that may attract wildlife are prohibited from the airport, and such prohibition is to be enforced by the Airport Manager or other designated airport representatives.

2. Removal of Deleterious Material

In the event that anyone should dispose of any form of deleterious material that could attract birds or wildlife, the Airport Manager or other designated Department of Transportation and Public Facilities representative is to take action immediately to dispose of the material at a location off airport property.

3. Existing Conditions

Due to the close proximity of the Sitka Airport to salt water and the fact that it is in the path of a minor fly way for migratory birds, the airport can be considered to have a bird hazard problem.

Gulls, eagles, crows, and ravens, find the runway a desirable place to roost during stormy weather at certain times of the year. All necessary precautions must be taken to keep the runway clear of birds. Present conditions are described in the Airport/Facility Directory, Alaska Supplement.

4. Wildlife Control Procedures

The Airport Management has the authority from the U.S. Fish and Wildlife Service and the State of Alaska to harass and/or destroy gulls, crows and ravens on the Sitka Airport. In the case of eagles, the Airport Management has a permit to harass the offending eagles. These permits are kept on file in the Airport Manager's office.

The Airport Manager or his designee will conduct a minimum of four (4) shotgun patrols daily. These patrols will coincide with air carrier schedules.

When necessary the following control procedures will be initiated. Approximately 15-20 minutes prior to an air carrier operation the Airport Manager will:

a. Inspect the full length of the active runway for wildlife or bird concentration activities.

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES SOUTHEAST REGION AIRPORT CERTIFICATION MANUAL	NAME Federal Aviation Administration SITKA ~~AAL-620~~ REVISION APPROVED BY: OCT 24 1995
CHAPTER NO. AND TITLE XV. WILDLIFE HAZARD MANAGEMENT	PAGE NO: 2 of 2

b. When necessary, noise making devices will be used in attempts to disperse birds or wildlife. Depredation permits have been issued by the Department of Interior to take, by shotgun, raven, crows, and gulls.

c. If necessary, wildlife control personnel will remain in the vicinity of the runway to insure that wildlife, when dispersed, does not re-enter the runway environment. If attempts to disperse wildlife and birds are unsuccessful, the Airport Manager will issue a NOTAM through Sitka FSS and notify air carrier operations of the extent of bird or wildlife hazards.

d. When, in the opinion of the Airport Manager, wildlife hazards no longer exist, control procedures will be reduced to a minimum of four (4) shotgun patrols daily and the NOTAM canceled. A record of the daily shotgun patrols, and the birds and species destroyed, is kept in the Airport Manager's office. A copy of this report is shown at Exhibit 15-1 and 15-2.

e. The Airport Manager or his designated representative, will prevent domestic animals from entering the airport movement areas (AMA). The Airport Manager or his designated representative will remove such animals found on the airport. Under certain circumstances, the Airport Manager may eliminate such animals constituting a hazard to the airport operation, "Only after all attempts to catch and restrain the animal have failed". An appropriate fee, sufficient to reimburse the State of Alaska for any damages upon the airport and/or costs incurred for removing the animal. shall be paid by the owner of the animal.

APPENDIX 5 *(4 Pages)*

STATE AND FEDERAL DEPREDATION PERMITS

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(1/97)

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

ALASKA DEPT. TRANSPORTATION
SOUTHEAST REGION, 6860 GLACIER HWY
JUNEAU, AK 99801-7999

2. AUTHORITY-STATUTES
16 USC 703-712

REGULATIONS (Attached)
50 CFR Part 13
50 CFR 21.41

3. NUMBER
MB009959-0

4. RENEWABLE	5. MAY COPY
[X] YES	[X] YES
[ ] NO	[ ] NO

6. EFFECTIVE	7. EXPIRES
03/31/1999	12/31/1999

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business)
MIKE BINKIE
AIRPORT SAFETY & COMPLIANCE OFFICER

9. TYPE OF PERMIT
DEPREDATION

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
ROCKY GUTIERREZ AIRPORT
SITKA AK

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. Authorized to take the following migratory bird species by shotgun in conjunction with control operations to prevent hazards to aircraft: Canada Goose, Greater White-fronted Goose, Snow Goose, American Wigeon, Geen-winged Teal, Mallard, Black-bellied Plover, Dunlin, Killdeer, Least Sandpiper, Long-billed Dowitcher, Short-billed Dowitcher, Pacific Golden Plover, Pectoral Sandpiper, Sanderling, Semipalmated Plover, Western Sandpiper, Whimbrel, Glaucous-winged Gull, Mew Gull, Commom Raven and Northwestern Crow.

E. Dead gulls will be promptly picked up and destroyed. All other specimens killed will be turned over to the U. S. Fish and Wildlife Service, Juneau, Alaska, phone (907) 586-7331.

F. Permittee must have written authority from the Alaska Department of Fish and Game, Juneau, Alaska, before exercising any of the authorities granted by this permit.

G. Subpermitttees: Lincoln Chapman, Ron Kinman, Karl Koch, Jay Linhart, Dave Luchinetti, Kelly Pratt, Frank Schlais, Gregory Selby and Mike Webb. Subpermittees must be trained in airport bird control operations by U.S.D.A. Wildlife Services. All subpermittees must be provided with a copy of this permit. A current list of subpermittees will be sent to the U.S. Fish and Wildlife Service as changes occur.

[X] ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE: 1/31
REPORT FORMS WILL BE PROVIDED AT A LATER DATE.

ISSUED BY	TITLE	DATE
Steven J. Kendall	CHIEF - PERMIT SECTION	03/31/1999

Steven J. Kendall [illegible]

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(1/97)

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

ALASKA DEPT. TRANSPORTATION
SOUTHEAST REGION, 6860 GLACIER HWY
JUNEAU, AK 99801-7999

2. AUTHORITY-STATUTES
16 USC 668a

REGULATIONS (Attached)
50 CFR Part 13
50 CFR 22.23

3. NUMBER
MB690087-0

4. RENEWABLE
[X] YES
[ ] NO

5. MAY COPY
[ ] YES
[ ] NO

6. EFFECTIVE
03/08/1999

7. EXPIRES
12/31/1999

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business)
MIKE BINKIE
AIRPORT SAFETY & COMPLIANCE OFFICER

9. TYPE OF PERMIT
EAGLE DEPREDATION

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
THE STATE OPERATED AIRPORTS AT GUSTAVUS, HAINES, PETERSBURG, WRANGELL, YAKUTAT, KLAWOCK, AND SITKA, ALASKA.

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. Authorized to scare Bald Eagles away from the airport property with the aid of cracker shells, pyrotechnics, or other noise-making devices.

E. This permit does NOT allow the killing, injuring, or capturing of any Bald Eagles.

F. Display this permit on request when conducting any authorized activity.

G. Permittee must have written authority from the Alaska Department of Fish and Game, Juneau, Alaska, before exercising any of the authorities granted by this permit.

H. Subpermittes: Anyone trained in bird dispersal work and under the supervision of the permittee. Permittee will supply the issuing office with a list of subpermittees, updated quarterly.

[X] ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE 1/31.
REPORT, DETAILING NUMBER OF TIMES EAGLES WERE HARASSED ON AIRPORT PROPERTY, AND METHODS USED, MUST BE REPORTED

ISSUED BY	TITLE	DATE
Steven J. Kendall	CHIEF - PERMIT SECTION	03/08/1999

cc: ARD/LE R7; ADF&G, Juneau

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
P.O. Box 25526
JUNEAU, ALASKA 99802-5526

Permit No. 99-089

Expires 12/31/99

PUBLIC SAFETY PERMIT

This permit authorizes AK Department of Transportation and Public Facilities, Michael G. Binkie, Safety Officer
(person, agency or organization)
of Southeast Region, 6860 Glacier Highway, Juneau, AK 99801-7999 (address) to conduct the following activities from April 27, 1999 to December 31, 1999 in accordance with AS 16.05.930.

Authority is granted the permittee and anyone under his direct supervision trained in bird dispersal work to take gulls, mallards, ravens, and crows by shotgun, to prevent hazards to arriving and departing aircraft at the Gustavus, Haines, Petersburg, Wrangell, Yakutat, Klawock, and Sitka state-operated airports.

Also authorized to take Canada goose, greater white-fronted goose, snow goose, American wigeon, green-winged teal, black bellied plover, dunlin, killdeer, least sandpiper, long-billed dowitcher, short-billed dowitcher, Pacific golden plover, pectoral sandpiper, sanderling, semipalmated plover, western sandpiper, and whimbrel at the Sitka airport to prevent hazards to arriving and departing aircraft.

Also authorized to haze bald eagles from airport property at these state-operated airports. This permit does not authorize the killing or attempted killing of bald eagles. All other conditions same as federal permit.

Also authorized to haze deer, moose, porcupine, and bear from the above airports to prevent hazards to arriving and departing aircraft. These animals may not be killed without separate authorization from this office.

FEDERAL PERMITS MB009959-0, MB690087-0, MB690088-0, AND THIS PERMIT MUST BE IN POSSESSION.

REPORT DUE January 31, 2000. **The report shall include species, numbers, dates and locations of collection, hazing, and disposition, sex, age, breeding condition, and any additional information specified above.**

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.

2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.

3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.

4. Permits will not be renewed until detailed reports, as specified above, have been received by the department.

5. UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.

Division of Wildlife Conservation

April 27, 1999
Date

APPENDIX 6 *(2 Pages)*

SITKA ANNUAL REPORT OF BIRD TAKE

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES SOUTHEAST REGION AIRPORT CERTIFICATION MANUAL	NAME Federal Aviation Administration SITKA AAL-620 REVISION APPROVED BY: OCT 24 1995 DGW
CHAPTER NO. AND TITLE XV. WILDLIFE HAZARD MANAGEMENT	PAGE NO: Exhibit 15-2

SITKA AIRPORT
ANNUAL BIRD REPORT

FAXED 1/6/99 YT
TO: PAM IE

1998

MONTH	ESTIMATED # OF BIRDS ON RUNWAY	EAGLES SIGHTED	GULLS DESTROYED	RAVENS DESTROYED	CROWS DESTROYED	MISC. BIRDS DESTROYED
JANUARY	1206	75	14	1	0	0
FEBRUARY	952	84	43	3	0	0
MARCH	1272	221	27	7	2	0
APRIL	3143	546	33	17	2	2
MAY	2142	519	33	0	1	19
JUNE	965	759	2	1	3	0
JULY	903	330	2	11	1	2
AUGUST	1026	72	5	7	1	41
SEPTEMBER	6161	43	85	0	0	7
OCTOBER	2218	35	15	0	5	1
NOVEMBER	3432	53	95	10	9	1
DECEMBER	563	56	39	5	0	6
YEAR END TOTALS	23983	2793	393	62	24	79

APPENDIX 7 *(2 Pages)*

WILDLIFE CONTROL DATA SHEETS

Sitka Airport Wildlife Control Data Sheet

Date 6-4-98

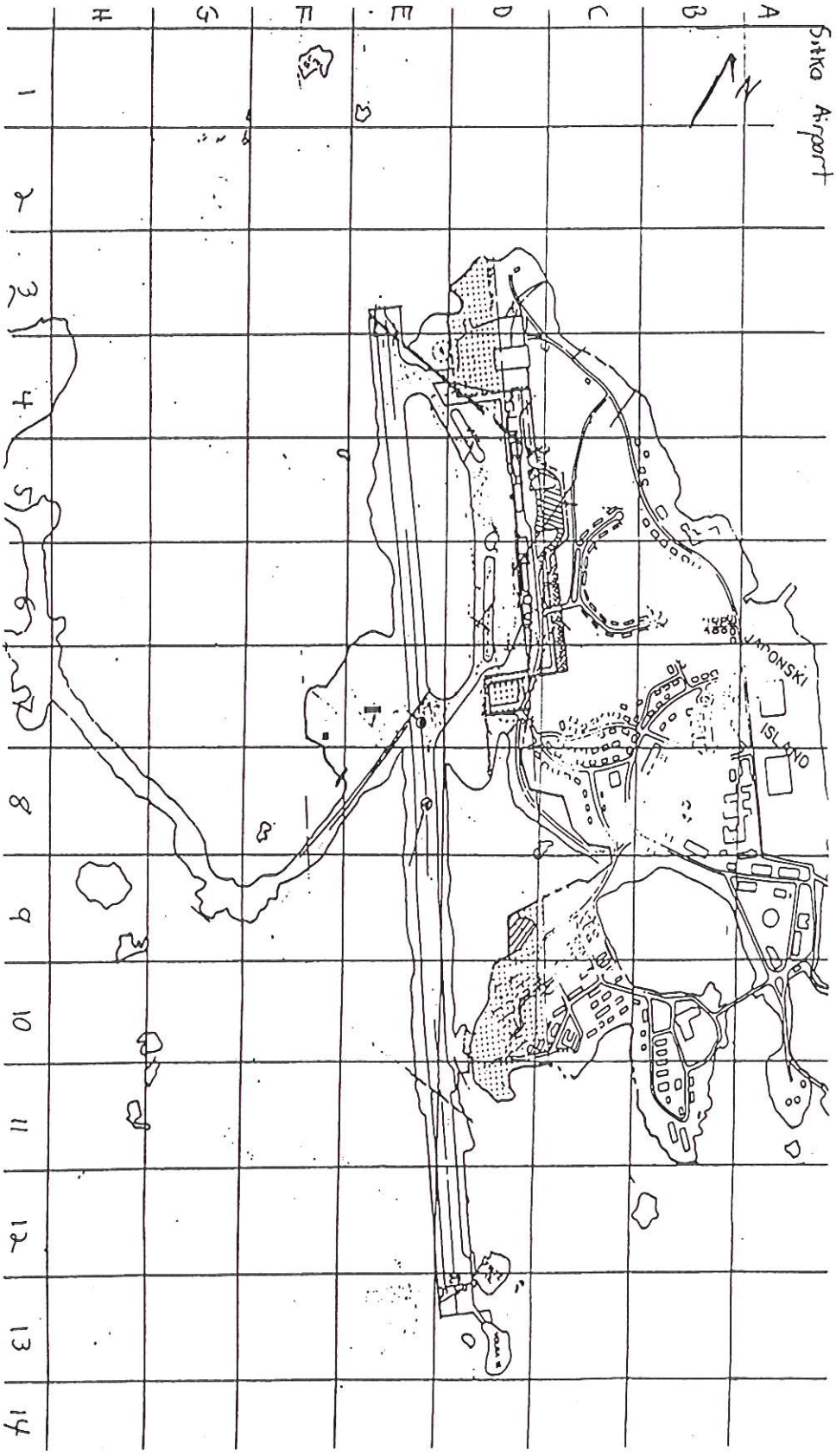
Time	Location	#	Species	Crackershells	Bangers	Screamers	Shooting	Vehicle	Comments
0930	21-22	20	Crows Eagles	X			X		
1020	20-22	30	Eagles	X					NoTam 155. 1018
1120	20-22	2	Eagles			X			
16:20	21-21	2	eagles			✓			

Time = Military time preferred.
Location = Preferrably grid coordinates.
# = The number of animals hazed or killed.
Species = Name of animal (e.g. Common Raven, Glaucous-winged Gull).
Methods = Put a check in the box for any and all methods that you used for control. *Shooting* refers to lethal control.
Comments = Comments on the animals response to the hazing effort are important. Any other comments regarding the animal's behavior are also useful.

Additional Comments:

APPENDIX 8 *(2 Pages)*

GRID MAP OF SITKA AIRPORT


Sitka Airport
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14
JAMONSKI
ISLAND

APPENDIX 9 *(3Pages)*

ENDANGERED, THREATENED AND CANDIDATE SPECIES IN ALASKA
U.S. FISH AND WILDLIFE SERVICE
January 1998

LISTED SPECIES	STATUS	LEAD OFFICE	RANGE IN AK
Birds			
Aleutian Canada goose (*Branta canadensis leucopareia*)	T	ANC	Aleutian Is., Semidi Is.
American peregrine falcon (*Falco peregrinus anatum*)	E	FAI	Interior AK
Eskimo curlew (*Numenius borealis*)	E	FAI	No longer occurs in AK
Short-tailed albatross (*Phoebastria albatrus*)	C	ANC	U.S. Territorial waters, Gulf of AK, Aleutian Islands, Bering Sea Coast. *The short-tailed albatross is currently listed as endangered only on the high seas, and in Japan and Russia.*
Spectacled eider (*Somateria fischeri*)	T	ANC	Western and Northern AK (coastal)
Steller's eider (*Polysticta stelleri*)	T	FAI	Southwestern, Western and Northern AK
Plants			
Aleutian shield fern (*Polystichum aleuticum*)	E	ANC	Adak Island
PROPOSED SPECIES			
currently none			
DELISTED SPECIES			
Arctic peregrine falcon (*Falco peregrinus tundrius*)	D	FAI	Northern, Western AK

LISTED SPECIES MANAGED BY THE **NATIONAL MARINE FISHERIES SERVICE**

Under the Endangered Species Act of 1973, as amended, the National Marine Fisheries Service is responsible for listed anadromous and marine fishes and marine mammals other than sea otters, manatees, and dugongs.

		Status
Mammals		
Balaena glacialis	Northern right whale	E
Balaena mysticetus	Bowhead whale	E
Balaenoptera borealis	Sei whale	E
Balaenoptera musculus	Blue whale	E
Balaenoptera physalus	Fin whale	E
Megaptera novaeangliae	Humpback whale	E
Physeter macrocephalus	Sperm whale	E
Eumetopias jubatus	Steller sea lion	T east of 144^0
Eumetopias jubatus	Steller sea lion	E west of 144^0
Fishes		
Oncorhynchus nerka	Snake River sockeye salmon	E
Oncorhynchus tshawytscha	Snake River spring/summer chinook salmon	T
Oncorhynchus tshawytscha	Snake River fall chinook salmon	T
Oncorhynchus tshawytscha	Sacramento winter run chinook salmon	E
Reptiles		
Chelonia mydas (incl. *agassizi*)	Green sea turtle	T
Dermochelys coriacea	Leatherback sea turtle	E

Caretta caretta	Loggerhead sea turtle	T
Lepidochelys olivacea	Olive (Pacific) ridley sea turtle	T

DELISTED

Mammals

Eschrichtius robustus	Gray whale	D

Effective June 16, 1994

ADDRESSES

National Marine Fisheries Service
National Oceanic and Atmospheric Administration
222 West 7th Avenue, Box 43
Anchorage, Alaska 99513-7577
TEL: 907-271-5006

National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Protected Resources Division
P.O. Box 21668
Juneau, AK 99802-1668
TEL: 907-586-7235

Fish and Wildlife Service
Regional Office
Division of Endangered Species
1011 E. Tudor Road
Anchorage, Alaska 99503-6199
TEL: 907-786-3520
FAX: 907-786-3625

Fish and Wildlife Service
Ecological Services, Juneau
3000 Vintage Blvd., Suite 201
Juneau, Alaska 99801
TEL: 907-586-7240
FAX: 907-586-7154

Fish and Wildlife Service
Ecological Services, Fairbanks
101 12th Ave. Box 19, Rm 110
Fairbanks, Alaska 99701
TEL: 907-456-0388
FAX: 907-456-0208

Fish and Wildlife Service
Ecological Services, Anchorage
605 West 4th Avenue, Room G-62
Anchorage, Alaska 99501
TEL: 907-271-2888
FAX: 907-271-2786

KEY AND DEFINITIONS

E	Endangered:	A species which is in danger of extinction throughout all or a significant portion its range.
T	Threatened:	A species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
P	Proposed:	A species formally proposed for listing as endangered or threatened in the Federal Register.
D	Delisted:	A species that has been removed from the list of threatened and endangered species. The Fish and Wildlife Service will monitor these species for a period of at least five years following delisting.
C	Candidate:	A species for which the Service has on file sufficient information on biological vulnerability and threat(s) to support proposals as threatened or endangered (formerly Category 1 Candidate species).

Cite as: U.S. Fish and Wildlife Service. 1998. Endangered, threatened and candidate species in Alaska. Unpublished report, Office of Ecological Services. Anchorage, Alaska.

APPENDIX 10 (1 Page).

ALASKA WILDLIFE STATUTES

Alaska Statutes

Sec. 16.05.930. Exempted activities.

(b) This chapter does not prohibit a person from taking fish or game during the closed season, in case of dire emergency, as defined by regulation adopted by the appropriate board.

Alaska Administrative Code

5 AAC 92.033

PERMIT FOR SCIENTIFIC, EDUCATIONAL, PROPAGATIVE, OR PUBLIC SAFETY PURPOSES

(a) Notwithstanding restrictions in 5 AAC 78 - 5 AAC 88, the department may issue a permit for the taking, possessing, importing, or exporting of game for scientific, educational, propagative, or public safety purposes.

(b) The department may issue a permit for taking of big game for public safety purposes to an individual, including a state, municipal, or federal government official responsible for public safety, only as follows:

(1) the department shall evaluate all reported public safety problems involving big game brought to the department's attention, determine whether an actual threat to public safety is caused by a big game animal, and develop a list of all reasonable and practical solutions;

(2) if the department determines a threat to public safety can be resolved only by taking a big game animal under this section and no government official responsible for public safety is available, the department may issue a permit to a private individual;

(3) a permit that authorizes lethal taking of a big game animal issued to an individual other than a government official must be restricted to taking a specific, identified problem animal;

(4) a permit issued under this section must specify:

(A) name of the permittee and authorized subpermittees;
(B) the species of the big game animal that may be taken;
(C) the type of taking that is authorized, such as hazing, aversive conditioning, live trapping, or lethal taking;
(D) methods and means that may be employed;
(E) duration of the permit;
(F) the location of permitted activities;
(G) disposition of game taken; and
(H) reporting requirements.

History - Eff. 7/5/85, Register 95; am 12/31/96, Register 141; am 7/26/97, Register 143

APPENDIX 11 *(2 Pages)*

AIRPORT OBSERVATION SHEET AND RUNWAY COUNT FORM

USDA, APHIS, ADC

PAGE ____ OF ____

AIRPORT OBSERVATION SHEET

AIRPORT NAME			NAME OF OBSERVER	DATE
TEMPERATURE	WIND DIRECTION/SPEED	WEATHER CONDITION (See codes below)	TYPE OF STUDY	

TIME	OBSERVATION/ GRID LOCATION	A.O.U. ALPHA SPECIES CODE	NUMBER OF ANIMALS	ACTIVITY (See codes below)	COVER TYPE (See codes below)	DIRECTION OF MOVEMENT	COMMENTS

WEATHER
SU - sunny
PS = partly sunny
PC - partly cloudy
CL - cloudy
RN = rain
SN = snow/sleet
FG = fog

ACTIVITY
FD = feeding
LF = loafing
RS = roosting
NS = nesting
VO = vocalizing
FL = flying/localized
FP = flying/passing
TW = towering
HW = hawking insects
ST = standing
RN = running
BD = bedded down

COVER TYPE
RWY = runway
TWY - taxiway
RMP - ramp
ASP = asphalt/concrete
URP = unpaved road
STR = structure
DTC - ditch
GSH = grass, short
GLG = grass, long
SHR = shrubs
WDL = woodland
MAR - marsh/wetland
CRK = creek/stream
TSW = temporary standing water
PND = pond
RES = reservoir

ADC FORM 121-R
(MAY 93)

Runway Count

Date: _____
Start Time: _____

WEATHER DATA

Temp: _____
Wind Dir/Speed: _____
Weather Cond: _____

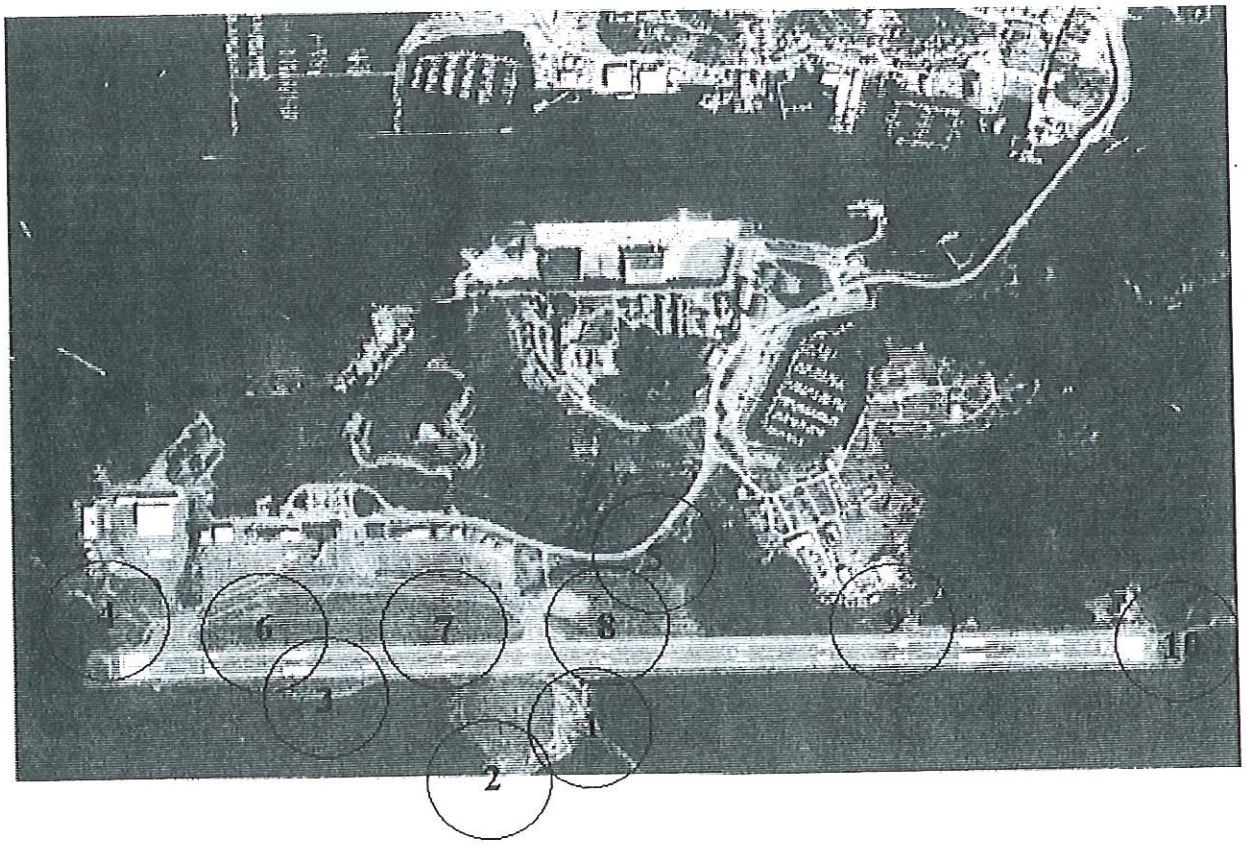
TIME	SPECIES/ PLANE	#	LOCATION	BEHAV	ALTITUDE	DIR	COMMENTS

Plane codes: *Takeoff (TO)*
Landing (L)
Touch & Go (TG)

Directions: Either 29 or 11

APPENDIX 12 *(1 Page)*

WHA Standardized Survey Points and GPS Coordinates



Point 1: N 57°02'82", W 135°21'87"

Point 2: N 57°02'86", W 135°22'05"

Point 3: N 57°03'04", W 135°22'14"

Point 4: N 57°03'26", W 135°22'33"

Point 5: N 57°02'90", W 135°21'53"

Point 6: N 57°03'15", W 135°22'14"

Point 7: N 57°03'05", W 135°21'94"

Point 8: N 57°02'89", W 135°21'68"

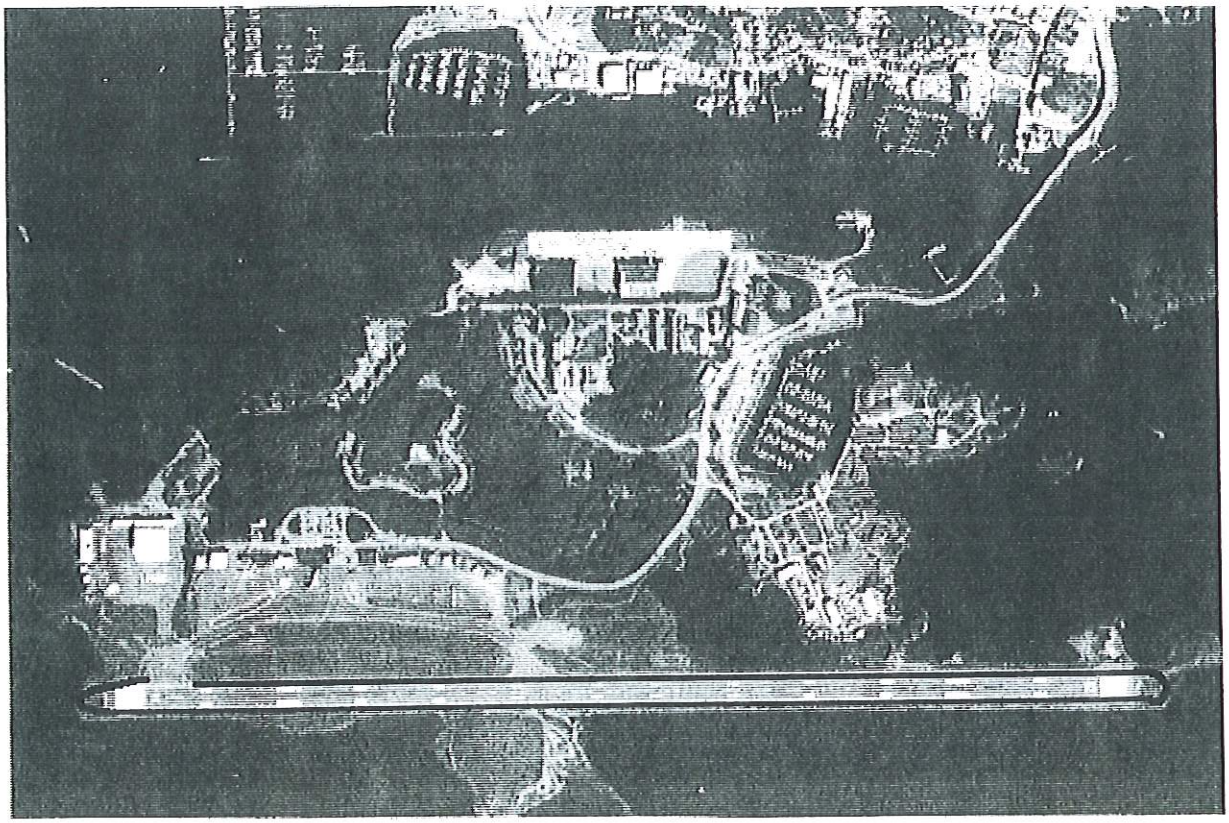
Point 9: N 57°02'65", W 135°21'30"

Point 10: N 57°02'44", W 135°20'96"

APPENDIX 13 *(1 Page)*

WHA Vehicle Survey Route

(Black line on runway indicates route)



APPENDIX 14 *(3 Pages)*

Wildlife Hazard Assessment Species List

Sitka Rocky Gutierrez Airport

14-Sep-99

Guild	Species: Common name	Scientific name
Dabblers		
	American Wigeon	*Anas americana*
	Canada Goose	*Branta canadensis*
	Greater White-fronted Goose	*Anser albifrons*
	Green-winged Teal	*Anas crecca*
	Mallard	*Anas platyrhynchos*
	Northern Pintail	*Anas acuta*
	Northern Shoveler	*Anas clypeata*
	Snow Goose	*Chen caerulescens*
	Trumpeter Swan	*Cygnus buccinator*
	Unidentified Dabbling Duck	*Anas spp.*
Divers		
	Barrow's Goldeneye	*Bucephala islandica*
	Bufflehead	*Bucephala albeola*
	Common Goldeneye	*Bucephala clangula*
	Common Loon	*Gavia immer*
	Common Merganser	*Mergus merganser*
	Common Murre	*Uria aalge*
	Double-crested Cormorant	*Phalacrocorax auritus*
	Greater Scaup	*Aythya marila*
	Harlequin Duck	*Histrionicus histrionicus*
	Horned Grebe	*Podiceps auritus*
	Lesser Scaup	*Aythya affinis*
	Marbled Murrelet	*Brachyramphus marmoratus*
	Oldsquaw	*Clangula hyemalis*
	Pacific Loon	*Gavia pacifica*
	Pelagic Cormorant	*Phalacrocorax pelagicus*
	Pigeon Guillemot	*Cepphus columba*
	Red-breasted Merganser	*Mergus serrator*
	Red-necked Grebe	*Podiceps grisegena*
	Surf Scoter	*Melanitta perspicillata*
	White-winged Scoter	*Melanitta fusca*
Fish-eaters		
	Arctic Tern	*Sterna paradisaea*
	Belted Kingfisher	*Ceryle alcyon*

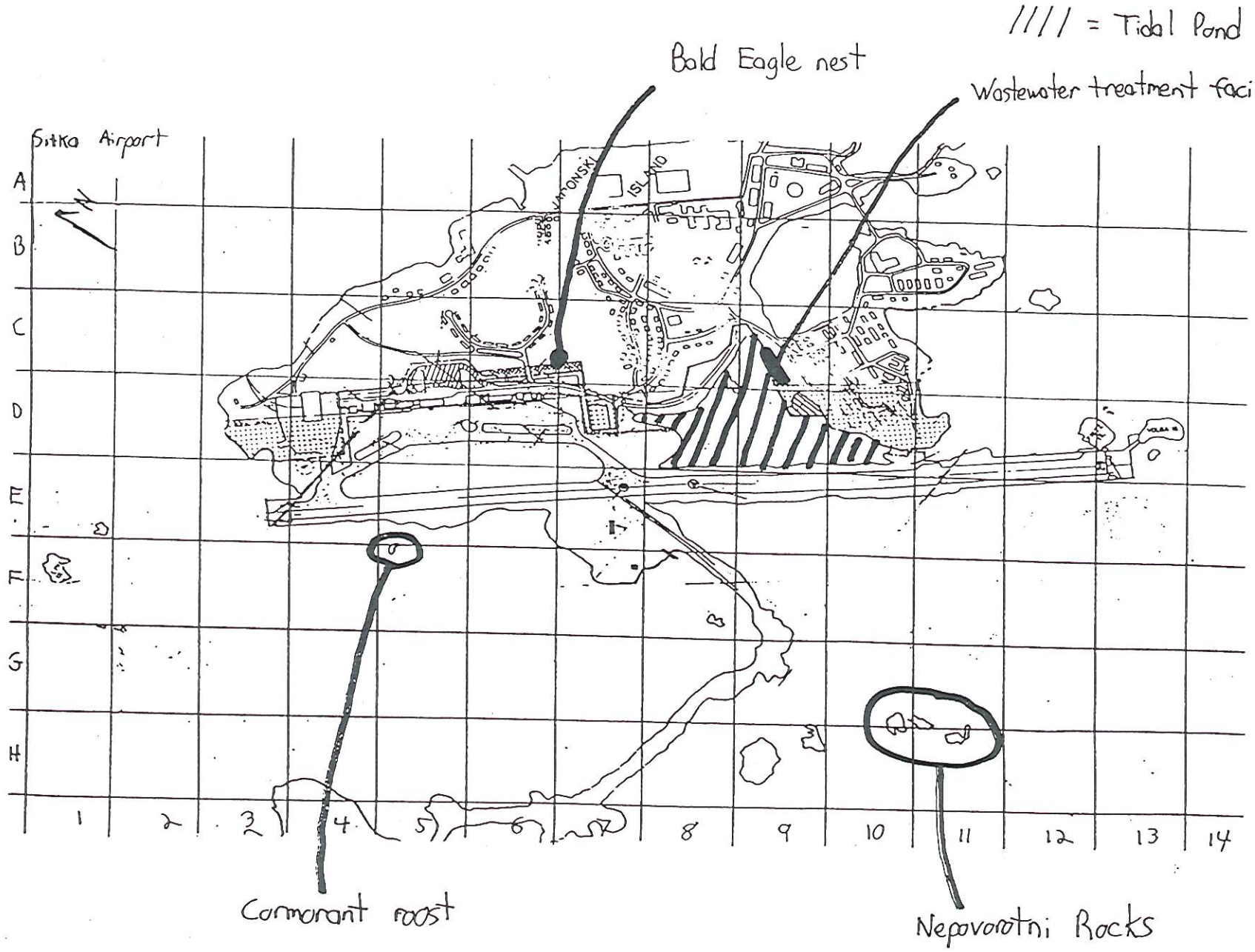
	Fork-tailed Storm-Petrel	*Oceanodroma furcata*
	Great Blue Heron	*Ardea herodias*
Gulls		
	Black-legged Kittiwake	*Rissa tridactyla*
	Glaucous-winged Gull	*Larus glaucescens*
	Herring Gull	*Larus argentatus*
	Mew Gull	*Larus canus*
	Unidentified Jaeger	*Stercorarius spp.*
Insectivores		
	American Pipit	*Anthus rubescens*
	American Robin	*Turdus migratorius*
	Barn Swallow	*Hirundo rustica*
	European Starling	*Sturnus vulgaris*
	Northern Flicker	*Colaptes auratus*
Land Mammals		
	Mink	*Mustela vison*
	River Otter	*Lutra canadensis*
Marine Mammals		
	Harbor Porpoise	*Phocoena phocoena*
	Harbor Seal	*Phoca vitulina*
	Humpback Whale	*Megaptera novaeangliae*
	Killer Whale	*Orcinus orca*
	Northern Sea Lion	*Eumetopias jubatus*
	Sea Otter	*Enhydra lutris*
Raptors		
	American Kestrel	*Falco sparverius*
	Merlin	*Falco columbarius*
	Northern Goshawk	*Accipiter gentilis*
	Northern Harrier	*Circus cyaneus*
	Peregrine Falcon	*Falco peregrinus*
	Red-tailed Hawk	*Buteo jamaicensis*
	Rough-legged Hawk	*Buteo lagopus*
	Short-eared Owl	*Asio flammeus*
	Snowy Owl	*Nyctea scandiaca*
Scavengers		
	Bald Eagle	*Haliaeetus leucocephalus*
	Common Raven	*Corvus corax*
	Northwestern Crow	*Corvus caurinus*
Shorebirds		
	Black Turnstone	*Arenaria melanocephala*
	Black-bellied Plover	*Pluvialis squatarola*
	Common Snipe	*Gallinago gallinago*
	Dunlin	*Calidris alpina*
	Greater Yellowlegs	*Tringa melanoleuca*

	Hudsonian Godwit	*Limosa haemastica*
	Killdeer	*Charadrius vociferus*
	Least Sandpiper	*Calidris minutilla*
	Lesser Yellowlegs	*Tringa flavipes*
	Long-billed Dowitcher	*Limnodromus scolopaceus*
	Pacific Golden-Plover	*Pluvialis fulva*
	Pectoral Sandpiper	*Calidris melanotos*
	Red Knot	*Calidris canutus*
	Red-necked Phalarope	*Phalaropus lobatus*
	Rock Sandpiper	*Calidris ptilocnemis*
	Sanderling	*Calidris alba*
	Semipalmated Plover	*Charadrius semipalmatus*
	Short-billed Dowitcher	*Limnodromus griseus*
	Spotted Sandpiper	*Actitis macularia*
	Surfbird	*Aphriza virgata*
	Unidentified Calidris spp.	*Callidris spp.*
	Unidentified Plover	*Pluvalis spp.*
	Western Sandpiper	*Calidris mauri*
	Whimbrel	*Numenius phaeopus*
Songbirds		
	American Dipper	*Cinclus mexicanus*
	American Tree Sparrow	*Spizella arborea*
	Dark-eyed Junco	*Junco hyemalis*
	Fox Sparrow	*Passerella iliaca*
	Golden-crowned Sparrow	*Zonotrichia atricapilla*
	Hermit Thrush	*Catharus guttatus*
	Lapland Longspur	*Calcarius lapponicus*
	Lincoln's Sparrow	*Melospiza lincolnii*
	Orange-crowned Warbler	*Vermivora celata*
	Pine Grosbeak	*Pinicola enucleator*
	Pine Siskin	*Carduelis pinus*
	Rufous Hummingbird	*Selasphorus rufus*
	Savannah Sparrow	*Passerculus sandwichensis*
	Song Sparrow	*Melospiza melodia*
	Swainson's Thrush	*Catharus ustulatus*
	Varied Thrush	*Ixoreus naevius*
	Western Flycatcher	*Empidonax difficilis*
	Wilson's Warbler	*Wilsonia pusilla*
	Yellow Warbler	*Dendroica petechia*

This is a current list of species observed during the Wildlife Hazard Assessment collected from all survey data.

APPENDIX 15 *(2 Pages)*

MAP OF WILDLIFE ATTRACTIONS IN THE VICINITY OF SIT


//// = Tidal Pond
Bald Eagle nest
Wastewater treatment facility
Sitka Airport
JAPONSKI
ISLAND
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14
Cormorant roost
Neprovorotni Rocks

APPENDIX 16 *(13 Pages)*

FAA ADVISORY CIRCULAR 5200-33
(Hazardous Wildlife Attraction on or Near Airports)

U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS

Date: 5/1/97
Initiated by: AAS-310 and APP-600

AC No: 150/5200-33
Change:

1. PURPOSE. This advisory circular (AC) provides guidance on locating certain land uses having the potential to attract hazardous wildlife to or in the vicinity of public-use airports. It also provides guidance concerning the placement of new airport development projects (including airport construction, expansion, and renovation) pertaining to aircraft movement in the vicinity of hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. APPLICATION. The standards, practices, and suggestions contained in this AC are recommended by the Federal Aviation Administration (FAA) for use by the operators and sponsors of all public-use airports. In addition, the standards, practices, and suggestions contained in this AC are recommended by the FAA as guidance for land use planners, operators, and developers of projects, facilities, and activities on or near airports.

3. BACKGROUND. Populations of many species of wildlife have increased markedly in the last few years. Some of these species are able to adapt to human-made environments, such as exist on and around airports. The increase in wildlife populations, the use of larger turbine engines, the increased use of twin-engine aircraft, and the increase in air-traffic, all combine to increase the risk, frequency, and potential severity of wildlife-aircraft collisions.

Most public-use airports have large tracts of open, unimproved land that are desirable for added margins of safety and noise mitigation. These areas can present potential hazards to aviation because they often attract hazardous wildlife. During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives world-wide, as well as billions of dollars worth of aircraft damage. Hazardous wildlife attractants near airports could jeopardize future airport expansion because of safety considerations.

DAVID L. BENNETT
Director, Office of Airport Safety and Standards

SECTION 1. HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1. TYPES OF HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS. Human-made or natural areas, such as poorly-drained areas, retention ponds, roosting habitats on buildings, landscaping, putrescible-waste disposal operations, wastewater treatment plants, agricultural or aquacultural activities, surface mining, or wetlands, may be used by wildlife for escape, feeding, loafing, or reproduction. Wildlife use of areas within an airport's approach or departure airspace, aircraft movement areas, loading ramps, or aircraft parking areas may cause conditions hazardous to aircraft safety.

All species of wildlife can pose a threat to aircraft safety. However, some species are more commonly involved in aircraft strikes than others. Table 1 lists the wildlife groups commonly reported as being involved in damaging strikes to U.S. aircraft from 1993 to 1995.

Table 1. Wildlife Groups Involved in Damaging Strikes to Civilian Aircraft, USA, 1993-1995.

Wildlife Groups	Percent involvement in reported damaging strikes
Gulls	28
Waterfowl	28
Raptors	11
Doves	6
Vultures	5
Blackbirds-Starlings	5
Corvids	3
Wading birds	3
Deer	11
Canids	1

1-2. LAND USE PRACTICES. Land use practices that attract or sustain hazardous wildlife populations on or near airports can significantly increase the potential for wildlife-aircraft collisions. FAA recommends against land use practices, within the siting criteria stated in 1-3, that attract or sustain populations of hazardous wildlife within the vicinity of airports or cause movement of hazardous wildlife onto, into, or across the approach or departure airspace, aircraft movement area, loading ramps, or aircraft parking area of airports.

Airport operators, sponsors, planners, and land use developers should consider whether proposed land uses, including new airport development projects, would increase the wildlife hazard. 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.

1-3. SITING CRITERIA. FAA recommends separations when siting any of the wildlife attractants mentioned in Section 2 or when planning new airport development projects to accommodate aircraft movement. The distance between an airport's aircraft movement areas, loading ramps, or aircraft parking areas and the wildlife attractant should be as follows:

a. Airports serving piston-powered aircraft. A distance of 5,000 feet is recommended.

b. Airports serving turbine-powered aircraft. A distance of 10,000 feet is recommended.

c. Approach or Departure airspace. A distance of 5 statute miles is recommended, if the wildlife attractant may cause hazardous wildlife movement into or across the approach or departure airspace.

SECTION 2. LAND USES THAT ARE INCOMPATIBLE WITH SAFE AIRPORT OPERATIONS.

2-1. GENERAL. The wildlife species and the size of the populations attracted to the airport environment are highly variable and may depend on several factors, including land-use practices on or near the airport. It is important to identify those land use practices in the airport area that attract hazardous wildlife. This section discusses land use practices known to threaten aviation safety.

2-2. PUTRESCIBLE-WASTE DISPOSAL OPERATIONS. Putrescible-waste disposal operations are known to attract large numbers of wildlife that are hazardous to aircraft. Because of this, these operations, when located within the separations identified in the sitting criteria in 1-3 are considered incompatible with safe airport operations.

FAA recommends against locating putrescible-waste disposal operations inside the separations identified in the siting criteria mentioned above. FAA also recommends against new airport development projects that would increase the number of aircraft operations or that would accommodate larger or faster aircraft, near putrescible-waste disposal operations located within the separations identified in the siting criteria in 1-3.

2-3. WASTEWATER TREATMENT FACILITIES. Wastewater treatment facilities and associated settling ponds often attract large numbers of wildlife that can pose a threat to aircraft safety when they are located on or near an airport.

a. New wastewater treatment facilities. FAA recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in the siting criteria in 1-3. During the siting analysis for wastewater treatment facilities, the potential to attract hazardous wildlife should be considered if an airport is in the vicinity of a proposed site. Airport operators should voice their opposition to such sitings. In addition, they should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

b. Existing wastewater treatment facilities. FAA recommends correcting any wildlife hazards arising from existing wastewater treatment facilities located on or near airports without delay, using appropriate wildlife hazard mitigation techniques. Accordingly, measures to minimize hazardous wildlife attraction should be developed in consultation with a wildlife damage management biologist. FAA recommends that wastewater treatment facility operators incorporate appropriate wildlife hazard mitigation techniques into their operating practices. Airport operators also should encourage those operators to incorporate these mitigation techniques in their operating practices.

c. Artificial marshes. Waste-water treatment facilities may create artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking birds, such as blackbirds and waterfowl, for breeding or roosting activities. FAA recommends against establishing artificial marshes within the separations identified in the siting criteria stated in 1-3.

d. Wastewater discharge and sludge disposal. FAA recommends against the discharge of wastewater or sludge on airport property. Regular spraying of wastewater or sludge disposal on unpaved areas may improve soil moisture and quality. The resultant turf growth requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw. The maimed or flushed organisms and the straw can attract hazardous wildlife and jeopardize aviation safety. In addition, the improved turf may attract grazing wildlife such as deer and geese.

Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

e. Underwater waste discharges. The underwater discharge of any food waste, e.g., fish processing offal, that could attract scavenging wildlife is not recommended within the separations identified in the siting criteria in 1-3.

2-4. WETLANDS.

a. Wetlands on or near Airports.

(1) **Existing Airports.** Normally, wetlands are attractive to many wildlife species. Airport operators with wetlands located on or nearby airport property should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations.

(2) **Airport Development.** When practicable, the FAA recommends siting new airports using the separations identified in the siting criteria in 1-3. Where alternative sites are not practicable or when expanding existing airports in or near wetlands, the wildlife hazards should be evaluated and minimized through a wildlife management plan prepared by a wildlife damage management biologist, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (COE).

NOTE: If questions exist as to whether or not an area would qualify as a wetland, contact the U.S. Army COE, the Natural Resource Conservation Service, or a wetland consultant certified to delineate wetlands.

b. Wetland mitigation.

Mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects. Wetland mitigation should be designed so it does not create a wildlife hazard.

(1) FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in the siting criteria in 1-3. Wetland mitigation banks meeting these siting criteria offer an ecologically sound approach to mitigation in these situations.

(2) Exceptions to locating mitigation activities outside the separations identified in the siting criteria in 1-3 may be considered if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge. Such mitigation must be compatible with safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife should be avoided. On-site mitigation plans may be reviewed by the FAA to determine compatibility with safe airport operations.

(3) Wetland mitigation projects that are needed to protect unique wetland functions (see 2-4.b.(2)), and that must be located in the siting criteria in 1-3 should be identified and evaluated by a wildlife damage management biologist before implementing the mitigation. A wildlife damage management plan should be developed to reduce the wildlife hazards.

NOTE: AC 150/5000-3, *Address List for Regional Airports Division and Airports District/Field Offices*, provides information on the location of these offices.

2-5. DREDGE SPOIL CONTAINMENT AREAS.

FAA recommends against locating dredge spoil containment areas within the separations identified in the siting criteria in 1-3, if the spoil contains material that would attract hazardous wildlife.

SECTION 3. LAND USES THAT MAY BE COMPATIBLE WITH SAFE AIRPORT OPERATIONS.

3-1. GENERAL. Even though they may, under certain circumstances, attract hazardous wildlife, the land use practices discussed in this section have flexibility regarding their location or operation and may even be under the airport operator's or sponsor's control. In general, the FAA does not consider the activities discussed below as hazardous to aviation if there is no apparent attraction to hazardous wildlife, or wildlife hazard mitigation techniques are implemented to deal effectively with any wildlife hazard that may arise.

3-2. ENCLOSED WASTE FACILITIES. Enclosed trash transfer stations or enclosed waste handling facilities that receive garbage indoors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles, generally would be compatible, from a wildlife perspective, with safe airport operations, provided they are not located on airport property or within the runway protection zone (RPZ). No putrescible-waste should be handled or stored outside at any time, for any reason, or in a partially enclosed structure accessible to hazardous wildlife.

Partially enclosed operations that accept putrescible-waste are considered to be incompatible with safe airport operations. FAA recommends these operations occur outside the separations identified in the siting criteria in 1-3.

3-3. RECYCLING CENTERS. Recycling centers that accept previously sorted, non-food items such as glass, newspaper, cardboard, or aluminum are, in most cases, not attractive to hazardous wildlife.

3-4. COMPOSTING OPERATIONS ON AIRPORTS. FAA recommends against locating composting operations on airports. However, when they are located on an airport, composting operations should not be located closer than the greater of the following distances: 1,200 feet from any aircraft movement area, loading ramp, or aircraft parking space; or the distance called for by airport design requirements. This spacing is intended to prevent material, personnel, or equipment from penetrating any Obstacle Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway (see AC 150/5300-13, *Airport Design*). On-airport disposal of compost by-products is not recommended for the reasons stated in 2-3.d.

a. Composition of material handled. Components of the compost should never include any municipal solid waste. Non-food waste such as leaves, lawn clippings, branches, and twigs generally are not considered a wildlife attractant. Sewage sludge, wood-chips, and similar material are not municipal solid wastes and may be used as compost bulking agents.

b. Monitoring on-airport composting operations. If composting operations are to be located on airport property, FAA recommends that the airport operator monitor composting operations to ensure that steam or thermal rise does not affect air traffic in any way. Discarded leaf disposal bags or other debris must not be allowed to blow onto any active airport area. Also, the airport operator should reserve the right to stop any operation that creates unsafe, undesirable, or incompatible conditions at the airport.

3-5. ASH DISPOSAL. Fly ash from resource recovery facilities that are fired by municipal solid waste, coal, or wood, is generally considered not to be a wildlife attractant because it contains no putrescible matter. FAA generally does not consider landfills accepting only fly ash to be wildlife attractants, if those landfills: are maintained in an orderly manner; admit no putrescible-waste of any kind; and are not co-located with other disposal operations.

Since varying degrees of waste consumption are associated with general incineration, FAA classifies the ash from general incinerators as a regular waste disposal by-product and, therefore, a hazardous wildlife attractant.

3-6. CONSTRUCTION AND DEMOLITION (C&D) DEBRIS LANDFILLS. C&D debris (Class IV) landfills have visual and operational characteristics similar to putrescible-waste disposal sites. When co-located with putrescible-waste disposal operations, the probability of hazardous wildlife attraction to C&D landfills increases because of the similarities between these disposal activities.

FAA generally does not consider C&D landfills to be hazardous wildlife attractants, if those landfills: are maintained in an orderly manner; admit no putrescible-waste of any kind; and are not co-located with other disposal operations.

3-7. WATER DETENTION OR RETENTION PONDS. The movement of storm water away from runways, taxiways, and aprons is a normal function on most airports and is necessary for safe aircraft operations. Detention ponds hold storm water for short periods, while retention ponds hold water indefinitely. Both types of ponds control runoff, protect water quality, and can attract hazardous wildlife. Retention ponds are more attractive to hazardous wildlife than detention ponds because they provide a more reliable water source.

To facilitate hazardous wildlife control, FAA recommends using steep-sided, narrow, linearly-shaped, rip-rap lined, water detention basins rather than retention basins. When possible, these ponds should be placed away from aircraft movement areas to minimize aircraft-wildlife interactions. All vegetation in or around detention or retention basins that provide food or cover for hazardous wildlife should be eliminated.

If soil conditions and other requirements allow, FAA encourages the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

3-8. LANDSCAPING. Wildlife attraction to landscaping may vary by geographic location. FAA recommends that airport operators approach landscaping with caution and confine it to airport areas not associated with aircraft movements. All landscaping plans should be reviewed by a wildlife damage management biologist. Landscaped areas should be monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be implemented immediately.

3-9. GOLF COURSES. Golf courses may be beneficial to airports because they provide open space that can be used for noise mitigation or by aircraft during an emergency. On-airport golf courses may also be a concurrent use that provides income to the airport.

Because of operational and monetary benefits, golf courses are often deemed compatible land uses on or near airports. However, waterfowl (especially Canada geese) and some species of gulls are attracted to the large, grassy areas and open water found on most golf courses. Because waterfowl and gulls occur throughout the U.S., FAA recommends that airport operators exercise caution and consult with a wildlife damage management biologist when considering proposals for golf course construction or expansion on or near airports. Golf courses should be monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be implemented immediately.

3-10. AGRICULTURAL CROPS. As noted above, airport operators often promote revenue-generating activities to supplement an airport's financial viability. A common concurrent use is agricultural crop production. Such use may create potential hazards to aircraft by attracting wildlife. Any proposed on-airport agricultural operations should be reviewed by a wildlife damage management biologist. FAA generally does not object to agricultural crop production on airports when: wildlife hazards are not predicted; the guidelines for the airport areas specified in 3-10.a-f. are observed; and the agricultural operation is closely monitored by the airport operator or sponsor to ensure that hazardous wildlife are not attracted.

NOTE: If wildlife becomes a problem due to on-airport agricultural operations, FAA recommends undertaking the remedial actions described in 3-10.f.

a. Agricultural activities adjacent to runways. To ensure safe, efficient aircraft operations, FAA recommends that no agricultural activities be conducted in the Runway Safety Area (RSA), OFA, and the OFZ (see AC 150/5300-13).

b. Agricultural activities in areas requiring minimum object clearances. Restricting agricultural operations to areas outside the RSA, OFA, OFZ, and Runway Visibility Zone (RVZ) (see AC 150/5300-13) will normally provide the minimum object clearances required by FAA's airport design standards. FAA recommends that farming operations not be permitted within areas critical to the proper operation of localizers, glide slope indicators, or other visual or electronic navigational aids. Determinations of minimal areas that must be kept free of farming operations should be made on a case-by-case basis. If navigational aids are present, farm leases for on-airport agricultural activities should be coordinated with FAA's Airway Facilities Division, in accordance with FAA Order 6750.16, *Siting Criteria for Instrument Landing Systems.*

NOTE: Crop restriction lines conforming to the dimensions set forth in Table 2 will normally provide the minimum object clearance required by

FAA airport design standards. The presence of navigational aids may require expansion of the restricted area.

c. **Agricultural activities within an airport's approach areas.** The RSA, OFA, and OFZ all extend beyond the runway shoulder and into the approach area by varying distances. The OFA normally extends the farthest and is usually the controlling surface. However, for some runways, the TSS (see AC 150/5300-13, Appendix 2) may be more controlling than the OFA. The TSS may not be penetrated by any object. The minimum distances shown in Table 2 are intended to prevent penetration of the OFA, OFZ, or TSS by crops or farm machinery.

NOTE: Threshold Siting standards should not be confused with the approach areas described in Title 14, Code of Federal Regulations, Part 77, (14 CFR 77), *Objects Affecting Navigable Airspace.*

d. **Agricultural activities between intersecting runways.** FAA recommends that no agricultural activities be permitted within the RVZ. If the terrain is sufficiently below the runway elevation, some types of crops and equipment may be acceptable. Specific determinations of what is permissible in this area requires topographical data. For example, if the terrain within the RVZ is level with the runway ends, farm machinery or crops may interfere with a pilot's line-of-sight in the RVZ.

e. **Agricultural activities in areas adjacent to taxiways and aprons.** Farming activities should not be permitted within a taxiway's OFA. The outer portions of aprons are frequently used as a taxilane and farming operations should not be permitted within the OFA. Farming operations should not be permitted between runways and parallel taxiways.

f. **Remedial actions for problematic agricultural activities.** If a problem with hazardous wildlife develops, FAA recommends that a professional wildlife damage management biologist be contacted and an on-site inspection be conducted. The biologist should be requested to determine the source of the hazardous wildlife attraction and suggest remedial action. Regardless of the source of the attraction, prompt remedial actions to protect aviation safety are recommended. The remedial actions may range from choosing another crop or farming technique to complete termination of the agricultural operation.

Whenever on-airport agricultural operations are stopped due to wildlife hazards or annual harvest, FAA recommends plowing under all crop residue and harrowing the surface area smooth. This will reduce or eliminate the area's attractiveness to foraging wildlife. FAA recommends that this requirement be written into all on-airport farm use contracts and clearly understood by the lessee.

Table 2. Minimum Distances Between Certain Airport Features And Any On-Airport Agriculture Crops.

Aircraft Approach Category And Design Group [1]	Distance In Feet From Runway Centerline To Crop		Distance In Feet From Runway End To Crop		Distance In Feet From Centerline Of Taxiway To Crop	Distance In Feet From Edge Of Apron To Crop
	Visual & ≥ ¾ mile	< ¾ mile	Visual & ≥ ¾ mile	< ¾ mile		
Category A & B Aircraft						
Group I	200 [2]	400	300 [3]	600	45	40
Group II	250	400	400 [3]	600	66	58
Group III	400	400	600	800	93	81
Group IV	400	400	1,000	1,000	130	113
Category C, D & E Aircraft						
Group I	530 [3]	575 [3]	1,000	1,000	45	40
Group II	530 [3]	575 [3]	1,000	1,000	66	58
Group III	530 [3]	575 [3]	1,000	1,000	93	81
Group IV	530 [3]	575 [3]	1,000	1,000	130	113
Group V	530 [3]	575 [3]	1,000	1,000	160	138
Group VI	530 [3]	575 [3]	1,000	1,000	193	167

1. Design Groups are based on wing span, and Category depends on approach speed of the aircraft.

Group I:	Wing span up to 49 ft.	Category A:	Speed less than 91 knots
Group II:	Wing span 49ft. up to 78 ft.	Category B:	Speed 91 knots up to 120 knots
Group III:	Wing span 79 ft. up to 117 ft.	Category C:	Speed 121 knots up to 140 knots
Group IV:	Wing span 118 ft. up to 170 ft.	Category D:	Speed 141 knots up to 165 knots
Group V:	Wing span 171 ft. up to 213 ft.	Category E:	Speed 166 knots or more
Group VI:	Wing span 214 ft. up to 261 ft.		

2. If the runway will only serve small airplanes (12,500 lb. And under) in Design Group I, this dimension may be reduced to 125 feet; however, this dimension should be increased where necessary to accommodate visual navigational aids that may be installed. For example farming operations should not be allowed within 25 feet of a Precision Approach Path Indicator (PAPI) light box.

3. These dimensions reflect the TSS as defined in AC 150/5300-13, Appendix 2. The TSS cannot be penetrated by any object. Under these conditions, the TSS is more restrictive than the OFA, and the dimensions shown here are to prevent penetration of the TSS by crops and farm machinery.

SECTION 4. NOTIFICATION OF FAA ABOUT HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AN AIRPORT.

4-1. GENERAL. Airport operators, land developers, and owners should notify the FAA in writing of known or reasonably foreseeable land use practices on or near airports that either attract or may attract hazardous wildlife. This section discusses those notification procedures.

4-2. NOTIFICATION REQUIREMENTS FOR WASTE DISPOSAL SITE OPERATIONS. The Environmental Protection Agency (EPA) requires any operator proposing a new or expanded waste disposal operation within 5 statute miles of a runway end to notify the appropriate FAA Regional Airports Division Office and the airport operator of the proposal (40 CFR 258, *Criteria for Municipal Solid Waste Landfills*, section 258.10, *Airport Safety*). The EPA also requires owners or operators of new municipal solid waste landfill (MSWLF) units, or lateral expansions of existing MSWLF units that are located within 10,000 feet of any airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway end used only by piston-type aircraft, to demonstrate successfully that such units are not hazards to aircraft.

a. **Timing of Notification.** When new or expanded MSWLFs are being proposed near airports, MSWLF operators should notify the airport operator and the FAA of this as early as possible pursuant to 40 CFR Part 258. Airport operators should encourage the MSWLF operators to provide notification as early as possible.

NOTE: AC 150/5000-3 provides information on these FAA offices.

b. **Putrescible-Waste Facilities.** In their effort to satisfy the EPA requirement, some putrescible-waste facility proponents may offer to undertake experimental measures to demonstrate that their proposed facility will not be a hazard to aircraft. To date, the ability to sustain a reduction in the numbers of hazardous wildlife to levels that existed before a putrescible-waste landfill began operating has not been successfully demonstrated. For this reason, demonstrations of experimental wildlife control measures should not be conducted in active aircraft operations areas.

c. **Other Waste Facilities.** To claim successfully that a waste handling facility sited within the separations identified in the siting criteria in 1-3 does not attract hazardous wildlife and does not threaten aviation, the developer must establish convincingly that the facility will not handle putrescible material other than that as outlined in 3-2. FAA requests that waste site developers provide a copy of an official permit request verifying that the facility will not handle putrescible material other than that as outlined in 3-2. FAA will use this information to determine if the facility will be a hazard to aviation.

4-3. NOTIFYING FAA ABOUT OTHER WILDLIFE ATTRACTANTS. While U. S. EPA regulations require landfill owners to provide notification, no similar regulations require notifying FAA about changes in other land use practices that can create hazardous wildlife attractants. Although it is not required by regulation, FAA requests those proposing land use changes such as those discussed in 2-3, 2-4, and 2-5 to provide similar notice to the FAA as early in the development process as possible. Airport operators that become aware of such proposed development in the vicinity of their airports should also notify the FAA. The notification process gives the FAA an opportunity to evaluate the effect of a particular land use change on aviation safety.

The land use operator or project proponent may use FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, or other suitable documents to notify the appropriate FAA Regional Airports Division Office.

It is helpful if the notification includes a 15-minute quadrangle map of the area identifying the location of the proposed activity. The land use operator or project proponent should also forward specific details of the proposed land use change or operational change or expansion. In the case of solid waste landfills, the information should include the type of waste to be handled, how the waste will be processed, and final disposal methods.

4-5. FAA REVIEW OF PROPOSED LAND USE CHANGES.

a. The FAA discourages the development of facilities discussed in section 2 that will be located within the 5,000/10,000-foot criteria in 1-3.

b. For projects which are located outside the 5,000/10,000-foot criteria, but within 5 statute miles of the airport's aircraft movement areas, loading ramps, or aircraft parking areas, FAA may review development plans, proposed land use changes, operational changes, or wetland mitigation plans to determine if such changes present potential wildlife hazards to aircraft operations. Sensitive airport areas will be identified as those that lie under or next to approach or departure airspace. This brief examination should be sufficient to determine if further investigation is warranted.

c. Where further study has been conducted by a wildlife damage management biologist to evaluate a site's compatibility with airport operations, the FAA will use the study results to make its determination.

d. FAA will discourage the development of any excepted sites (see Section 3) within the criteria specified in 1-3 if a study shows that the area supports hazardous wildlife species.

4-6. AIRPORT OPERATORS. Airport operators should be aware of proposed land use changes, or modification of existing land uses, that could create hazardous wildlife attractants within the separations identified in the siting criteria in 1-3. Particular attention should be given to proposed land uses involving creation or expansion of waste water treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas.

a. AIP-funded airports. FAA recommends that operators of AIP-funded airports, to the extent practicable, oppose off-airport land use changes or practices (within the separations identified in the siting criteria in 1-3) that may attract hazardous wildlife. Failure to do so could place the airport operator or sponsor in noncompliance with applicable grant assurances. FAA recommends against the placement of airport development projects pertaining to aircraft movement in the vicinity of hazardous wildlife attractants. Airport operators, sponsors, and planners should identify wildlife attractants and any associated wildlife hazards during any planning process for new airport development projects.

b. Additional coordination. If, after the initial review by FAA, questions remain about the existence of a wildlife hazard near an airport, the airport operator or sponsor should consult a wildlife damage management biologist. Such questions may be triggered by a history of wildlife strikes at the airport or the proximity of the airport to a wildlife refuge, body of water, or similar feature known to attract wildlife.

c. Specialized assistance. If the services of a wildlife damage management biologist are required, FAA recommends that land use developers or the airport operator contact the appropriate state director of the United States Department of Agriculture/Animal Damage Control (USDA/ADC), or a consultant specializing in wildlife damage management. Telephone numbers for the respective USDA/ADC state offices may be obtained by contacting USDA/ADC's Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD, 20737-1234, Telephone (301) 734-7921, Fax (301) 734-5157. The ADC biologist or consultant should be requested to identify and quantify wildlife common to the area and evaluate the potential wildlife hazards.

d. Notifying airmen. If an existing land use practice creates a wildlife hazard, and the land use practice or wildlife hazard cannot be immediately eliminated, the airport operator should issue a Notice to Airmen (NOTAM) and encourage the land owner or manager to take steps to control the wildlife hazard and minimize further attraction.

APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR.

1. GENERAL. This appendix provides definitions of terms used throughout this AC.

a. **Aircraft movement area.** The runways, taxiways, and other areas of an airport which are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft exclusive of loading ramps and aircraft parking areas.

b. **Airport operator.** The operator (private or public) or sponsor of a public use airport.

c. **Approach or departure airspace.** The airspace, within 5 statute miles of an airport, through which aircraft move during landing or takeoff.

d. **Concurrent use.** Aeronautical property used for compatible non-aviation purposes while at the same time serving the primary purpose for which it was acquired; and the use is clearly beneficial to the airport. The concurrent use should generate revenue to be used for airport purposes (see Order 5190.6A, *Airport Compliance Requirements*, sect. 5h).

e. **Fly ash.** The fine, sand-like residue resulting from the complete incineration of an organic fuel source. Fly ash typically results from the combustion of coal or waste used to operate a power generating plant.

f. **Hazardous wildlife.** Wildlife species that are commonly associated with wildlife-aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a wildlife-aircraft strike hazard.

g. **Piston-use airport.** Any airport that would primarily serve FIXED-WING, piston-powered aircraft. Incidental use of the airport by turbine-powered, FIXED-WING aircraft would not affect this designation. However, such aircraft should not be based at the airport.

h. **Public-use airport.** Any publicly owned airport or a privately-owned airport used or intended to be used for public purposes.

i. **Putrescible material.** Rotting organic material.

j. **Putrescible-waste disposal operation.** Landfills, garbage dumps, underwater waste discharges, or similar facilities where activities include processing, burying, storing, or otherwise disposing of putrescible material, trash, and refuse.

k. **Runway protection zone (RPZ).** An area off the runway end to enhance the protection of people and property on the ground (see AC 150/5300-13). The dimensions of this zone vary with the design aircraft, type of operation, and visibility minimum.

l. **Sewage sludge.** The de-watered effluent resulting from secondary or tertiary treatment of municipal sewage and/or industrial wastes, including sewage sludge as referenced in U.S. EPA's *Effluent Guidelines and Standards*, 40 C.F.R. Part 401.

m. **Shoulder.** An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface, support for aircraft running off the pavement, enhanced drainage, and blast protection (see AC 150/5300-13).

n. **Turbine-powered aircraft.** Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft rotary-wing aircraft.

o. **Turbine-use airport.** Any airport that ROUTINELY serves FIXED-WING turbine-powered aircraft.

p. **Wastewater treatment facility.** Any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes, including Publicly Owned Treatment Works (POTW), as defined by Section 212 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-576) and the Water Quality Act of 1987 (P.L. 100-4). This definition includes any pretreatment involving the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. (See 40 C.F. R. Section 403.3 (o), (p), & (q)).

q. Wildlife. Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring there of (50 CFR 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this AC, WILDLIFE includes feral animals and domestic animals while out of the control of their owners (14 CFR 139.3, *Certification and Operations: Land Airports Serving CAB-Certificated Scheduled Air Carriers Operating Large Aircraft (Other Than Helicopters)*).

r. Wildlife attractants. Any human-made structure, land use practice, or human-made or natural geographic feature, that can attract or sustain hazardous wildlife within the landing or departure airspace, aircraft movement area, loading ramps, or aircraft parking areas of an airport. These attractants can include but are not limited to architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquacultural activities, surface mining, or wetlands.

s. Wildlife hazard. A potential for a damaging aircraft collision with wildlife on or near an airport (14 CFR 139.3).

2. RESERVED.

APPENDIX 17 *(1 Page)*

WILDLIFE HAZARD MANAGEMENT PLAN
(Outline)

I. Introduction

A description of the species, conditions, and history associated with the known wildlife at the airport.

II. Authority

A discussion of the roles of the various airport management personnel in regard to wildlife hazard management.

III. Habitat Management

A discussion of the airport's current and projected wildlife habitat management goals and objectives. Should include:

a. water management
b. vegetation management
c. structure management
d. food/prey-base management

IV. Permits and Regulations

List the wildlife permits currently held or sought. Discuss the wildlife regulations that apply to the airport's wildlife deterrent activities.

V. Resources

Discuss the supply and personnel resources that are committed to wildlife hazard management at the airport.

VI. Wildlife Control Procedures

Describe the various wildlife harassment and/or destruction techniques used at the airport, as well as the protocol for the use of each of one.

VII. Training

Discuss the training procedures for personnel involved in wildlife hazard management activities.

VIII. Evaluation

Discuss the airport procedures for evaluating the success or failure of the wildlife hazard management procedures in operation at the airport.

IX. Appendices

Use this section to catalog useful reference materials. Include natural history information on the various species that frequent the airport, as well as technical bulletins or scientific publications that describe various management techniques for these species. This is also a good place to keep copies of the airport's state and federal depredation permits, bird strike reports, and a source of supply for equipment.

APPENDIX 18 (1 Page)

Sitka Rocky Gutierrez Airport Wildlife Control Data

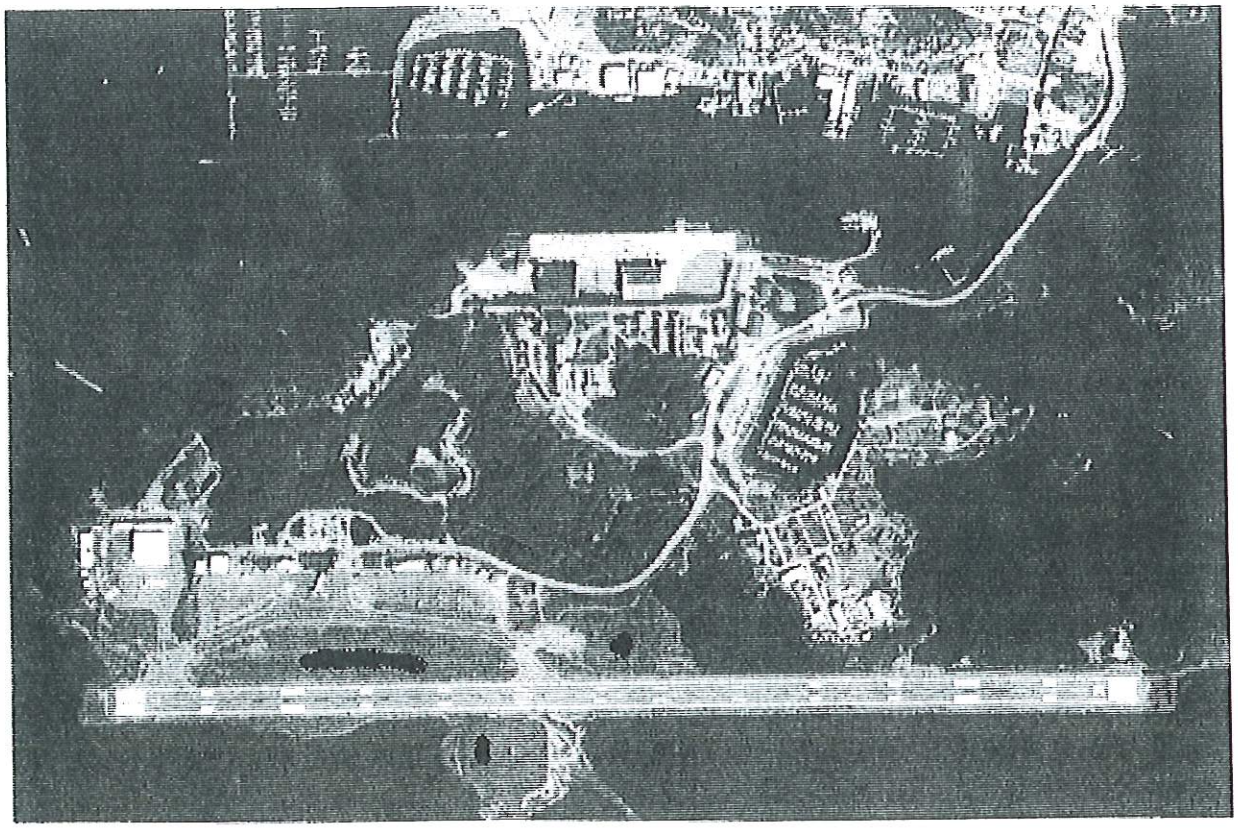
Date_____

Time	Location	#	Species	Action	Comments

Time = Military time preferred.
Location = Preferably grid coordinates.
# = The number of animals hazed or killed.
Species = Name of animal (e.g. Common Raven, Glaucous-winged Gull).
Action = Such as *Pyrotechnics (P), Shooting (S), Vehicle hazing (VH) etc.*
Comments = Comments on the animals response to the hazing effort are important. Any other comments regarding the animal's behavior are also useful.

APPENDIX 19 (1 Page)

Sitka Airport - Photograph showing areas of frequent temporary standing water (indicated by the black shading).



APPENDIX 20 ***(8 Pages)***

SOURCES OF WILDLIFE CONTROL SUPPLIES

EXCLUSION

Metal Wires or Projectors

Barrier Specialties
(800) 44BIRDS

Bird Control Devices, Inc.
Bloomington, IN

Cat Claw, Inc.
P.O. Box 3778
Johnstown, PA 15994

Nixalite of America
417 25th St.
Moline, IL 61265

Shaw Steeple Jacks, Inc.
2710 Bedford St.
Johnstown, PA 15904

Stan-Gard Pigeon & Bird Repellent
523 W. 184th St.
New York, NY

Electric Wire Systems

Avi-Away Division
Monard Molding, Inc.
P.O. Box 279
Council Grove, KS 66846

Electrepel, Inc.
491-495 Bergen St.
Brooklyn, NY
(718) 783-5943

Glenn County
Mosquito Abatement District
Willows, CA
(916) 934-4025
(Aquaculture fence)

Netting

A to Z Net Man
P.O. Box 2168
South Hackensack, NJ 07606
(201) 488-3888

Almac Plastics, Inc.
6311 Erdman
Baltimore, MD 21205-3585
(301) 485-9100

Apex Mills, Inc.
49 W. 37th St.
New York, NY 10018

Animal Repellents, Inc.
P.O. Box 168
Griffin, GA 30223
(800) 241-5064

Bird-X
325 W. Huron St.
Chicago, IL 60610
(312) 642-6871

Blue Mountain Industries
20 Blue Mountain Rd.
Blue Mountain, AL 36201
(205) 237-9461

Gilbert H. Bostock
Franconia, NH 03580

E. A. Britton
Plasting Netting Dept.
E.I. DuPont DeNemours Co.
Wilmington, DE 19898

E.I. DuPont DeNemours Co., Inc.
Yerkes Plant - "Vexar" Sales
Station B - Drawer L
Buffalo, NY 14027

Conwed Corp.
Plastics Division
P.O. Box 43237
St. Paul, MN 55164-0237

Bob Ellsworth
The Complete Winemaker
1219 Main St.
St. Helena, CA 94574
(707) 963-9681

Green Valley Blueberry Farm
9345 Ross Station Rd.
Sebastopol, CA 95472
(707) 887-7496

Internet, Inc.
2730 Nevada Ave. N.
Minneapolis, MN 55427

Margo Horticultural Suppliers
RR 6, Site 8, Box 2
Calgary, Alberta T2M 4L5
Canada (403) 285-9731

Nichols Net and Twine Co.
R.R. 3, Bend Road
East St. Louis, IL 62201

Orchard Supply Co.
P.O. Box 956
Sacramento, CA 95804
(916) 446-7821

Joseph Shea Co.
Commercial Fishing Supplies
Box 13
East Haddam, CT

SINCO Inc.
P.O. Box 361
East Hampton, CT 06424
(203) 267-2545

Teitzel's Ranier View -
Blueberry Farms
7720 E. 134th Ave.
Puyallup, WA 98371
(206) 863-6548

Wildlife Control Technology
6408 S. Fig St.
Fresno, CA 93706
(209) 268-1200

REPELLENTS

Noise Repellents -Electronic Alarm and Recorded Sounds

Evert Achterberg
P.O. Box 123
Escalon, CA 952320
(Double John Purivox Bird Scarer)

Adams Dominion, Inc.
1212 Weible Rd.
Crestwood, KY 40014
(502) 241-0241
(Animal Detection)

Air Birdstrike Prevention
15 Edgewood St.
Worchester, MA 01602
(301) 963-9270
(Radio-controlled Planes)

Applied Electronics Corp.
3003 County Line Rd.
Little Rock, AR 72201
(501) 821-3095

Arkansas Electronic Consultants
800 Stanton Rd.
Little Rock, AR 72209

Av-Alarm Corp.
675-D Conger St.
Eugene, OR 97402
(503) 342-1271

Electronic Game Calls
210 W. Grand Ave.
Wisconsin Rapids, WI 54495

Falcon Safety Products, Inc.
1065 Bristol Road
Mountainside, NJ 07092
(201) 233-5000 (Air Horn)

Jennings Industries, Inc.
2730 Chanticleer Ave.
Santa Cruz, CA 95060
(408) 475-8311

Margo Horticulture Supplies
RR6, Site 8, Box 2
Calgary, Alberta T2M 4L5 Canada
(403) 285-9731
(Motion Detector)

Signal Broadcasting Co.
2314 Broadway St.
Denver, CO 80205
(303) 295-0479
(Distress Call Tapes)

Wrightman Electronics, Inc.
P.O. Box 989
Easton, MD 21601

Noise Repellents - Exploders

Alexander-Tagg Ind.
395 Jacksonville Rd.
Warminster, PA 18974
(215) 675-7200

Coleman Equipment, Inc.
342 Madison Ave.
New York, NY 10017
(212) 687-2154
(Vigil Andy)

M. J. Flynn, Inc.
Syracuse, NY
(315) 437-6536
(Zon Gun)

C. Frensch Ltd.
168 Main St. E., Box 67
Grimsby, ONT L3M 1G4 Canada
(416) 945-3817

Pete Konzak
Box 20
Minnewaukan, ND 58351
(701) 473-5646

B.M. Lawrence & Co.
233 Sansome St.
San Francisco, CA 94104
(415) 981-3650

McKinzie Scientific
P.O. Box 1077, 1340 Kerr Ave.
Lancaster, OH 43130
(614) 687-4617

Pices Ind.
P.O. Box 6407
Modesto, CA 95355
(209) 578-5502

Reed-Joseph International Co.
P.O. Box 894
Greenville, MS 38702
(800) 647-5554

Smith-Roles
1367 S. Anna St.
Wichita, KS 67209
(316) 945-0295

Spring Ledge Farms
RD 3
Dundee, NY 14837

Teisd Kasei Co. Ltd.
350 S. Figueroa St., Suite 350
Los Angeles, CA 90071
(213) 680-4349

USDA, APHIS, ADC, DWRC
P.O. Box 25266, Bldg. 16
Denver Federal Center
Denver, CO 80225-0266
(303) 236-7877
(Farmer Fred)

Noise Repellents - Pyrotechnic Devices

The Bullseye Sunshop
1081 Huntingdon Ave.
Waterbury, CT 06704
(203) 755-1055

Colonial Fireworks
5956 Ivanhoe
Ipsilanti, MI 48197
(313) 482-3272

New Jersey Fireworks Co.
Box 118
Vineland, NJ 08360
(609) 692-8030
(Rope Firecrackers)

O.C. Ag Supply
1328 Allec St.
Anaheim, CA 92805
(714) 991-0960

Reed-Joseph International Co.
P.O. Box 894
Greenville, MS 38702
(800) 647-5554

Stoneco, Inc.
P.O. Box 187
Dacono, CO 80514
(303) 833-2376

Sutton Ag Ent.
1081 Harkins Rd.
Salinas, CA 93901
(408) 422-9693

Wald & Co.
208 Broadway
Kansas City, MO 64105
(816) 842-9299
(Rope Firecrackers)

Western Fireworks Co.
2542 SE 13th Ave.
Canby, OR 97013
(503) 266-7770

Oral Repellents

Avitrol Corp.
320 S. Boston Ave., Suite 514
Tulsa, OK 74103
(918) 582-3359

Bird-X
325 W. Huron St.
Chicago, IL 60610
(212) 642-6871

Tactile Repellents

Archem Corp.
1514 11th St.
P.O. Box 767
Portsmouth, OH 45662
(614) 353-1125

Baumes Castorine Co.
200 Matthew St.
P.O. Box 230
Rome, NY 13440
(315) 336-8154

Bird Control International
J.T. Eaton & Co.
P.O. Box 12
Macedonia, OH 44056

Crown Industries
4015 Papin St.
St.Louis, MO 63110
(314) 533-0999/(800) 325-3316

Hub States Corp.
419 E. Washington St.
Indianapolis, IN 46204
(800) 428-4416

The Tanglefoot Co.
314 Straight Ave. SW
Grand Rapids, MI 49504
(616) 459-4130

J.C. Ehrlich Chemical Co. State College Laboratories 840 William Ln. Reading, PA 19612
(Odor. Tactile)

Sanex Chemicals
5651 Dawson St.
Hollywood, FL 33023
(305) 961-6006

Velsicol Chemical Co.
341 E. Ohio St.
Chicago, IL 60611
(312) 670-4500

Hot Foot International
P.O. Box 14211
Baton Rouge, LA 70898
(800) BIRDS NO

Sun Pest Control
2945 McGee Trafficway
Kansas City, MO 64108
(816) 561-2174

Visual Repellents

Atmospheric Instrumentation Research (AIR), Inc.
1880 S. Flatiron Ct., Suite A
Boulder, CO 80301
(303) 443-7187
(Balloons, Kites)

R.E. Dietz Co.
225 Wilkinson St.
Syracuse, NY 13201
(315) 424-7400
(Strobe Lights)

Mellingers
2310 W. South Range Rd.
N. Lima, OH 44452
(800) 321-7444
(Scarecrow)

Robert Royal
P.O. Box 108
Midnight, MS 39115
(601) 247-4409
(Scary Man)

Raven Ind. Inc.
P.O. Box 1007
Sioux Falls, SD 57117
(605) 336-2750
(Balloons)

Tripp-Lite Mfg. Co.
500 N. Orleans
Chicago, IL 60610
(312) 226-7778 (Balloons)

Bird Scare Predator Eye, Inc.
1240 Josephine Rd.
Roseville, MN 55113
(612) 633-2384
(Balloons)

The Huge Co.
7625 Page Blvd.
St. Louis, MO 63133
(800) 325-3371
(Raptor Effigies, Lights)

Nishizawa (USA) Ltd.
112 W. 9th St., Ste. 903
Los Angeles, CA 90015
(213) 627-7491
(Mylar Balloons, Flash Tape)

Orchard Equipment & Supply
P.O. Box 540
Conway, MA 01341
(413) 359-4335
(Balloons)

Sutton Ag Ent.
1081 Harkins Rd.
Salinas, CA 93901
(408) 422-9693
(Kites)

Bird-X
325 W. Huron St.
Chicago, IL 60610
(312) 642-6871
(Raptor Effigies, Lights)

Kite City
1201 Front St.
Old Sacramento, CA 95814
(Hawk Kite)

Offshore Sourcing Development
1240 Josephine Rd.
Roseville, MN 55113
(612) 633-2384
(Balloons)

Pest Management Supply, Inc.
P.O. Box 938
Amherst, MA
(413) 253-3747
(Balloons, Flash Tape)

Tillotson Rubber Co.
RFD #1
Dixville Notch, NH 03576
(603) 255-3631
(Balloons)

PESTICIDES

Archem Corp.
1514 11th St., P.O. Box 767
Portsmouth, OH 45662
(614) 353-1125
(Strychnine)

Avitrol Corporation
P.O. Box 45141, 7644 E. 46th St.
Tulsa, OK 74145
(918) 663-1063

B & G Co.
10539 Maybank St., P.O. Box 20372
Dallas, TX 75220
(214) 357-5741
(Strychnine)

J.C. Ehrlich Chemical Co.
State College Laboratories
840 William Ln.
Reading, PA 19612
(215) 921-0641
(Strychnine)

Ralston Purina Co.
Checkerboard Square
St. Louis, MO 63164
(Starlicide)

Rid-A-Bird, Inc.
1224 Grandview Ave., P.O. Box 22
Muscatine, IA 52761
(319) 263-7970
(Toxic Perch)

LIVE TRAPS

Avinet, Inc.
Dryden, NY
(607) 844-3277
(Mist Nets)

Last Perch
Box 426
Mitchellville, IA 50169
(515) 967-2853

Meyer Manufacturing
Box 153
Garrison, IA 52229
(319) 477-5041
(Sparrow Trap)

McKinzie Scientific
1340 Kerr Ave., P.O. Box 1077
Lancaster, OH 43130
(614) 687-4617

Mustang Mfg. Co.
P.O. Box 10947
Houston, TX 77018
(713) 682-0811

Scotts Dog Supply
10329 Rockville Rd.
Indianapolis, IN 46234
(317) 271-2482
(Pigeon Traps)

Tomahawk Live Trap Co.
P.O. Box 323
Tomahawk, WI 54487
(715) 453-3550

Twin Cities Pigeon Eliminating Co.
P.O. Box 9270
Downers Grove, IL 60515
(312) 969-5829

Woodstream Corp.
Lititz, PA 17543
(717) 626-2125

MAMMAL CONTROL SUPPLIERS

EXCLUSION
Fencing

Advanced Farm Systems
RD 1, Box 364
Bradford, ME 04410
(207) 327-1237

Agri-Lease by Telemark
c/o George Brown, Jr., Dist. Mgr.,
Box 121
Chelmsford, MA 01824
(617) 256-7696

Aligned Fiber Composites
Common Sense Fencing, Inc.
2000 Highway 52 North
Chatfield, MN 55923
(507) 867-3071

American Forestry Tech., Inc.
1001 North 500 West
West Lafayette, IN 47906
(317) 583-3311

Bancroft Products, Inc.
c/o Harold "Chip" Rice
84 Iron Works Road
Concord, NH 03301
(603) 225-5572

Brookside Industries, Inc.
Brookside Farm
Turnbridge, VT 05077
(802) 889-3737

Communication Products Co.
P.O. Box 138
Marlboro, NJ 07746
(201) 462-6101

Dennis Roessiger
Route 109
Mirror Lake, NH
(603) 569-1620

Don Day Farm Service
RR 3, Box 48
Council Grove, KS 66846
(316) 767-5487

Gallagher Power Fence, Inc.
P.O. Box 708900
San Antonio, TX 78270
(512) 494-5211

Innovative Fence
(718) 381-3100
(315) 926-7700

K Fence System
c/o Hugh Kraemer
Zumbro Falls, MN 55991
(507) 753-2943

Kencove Fence
111 Kendall Lane
Blairsville, PA 15717
(800) 245-6902

Kiwi Fence Systems, Inc.
RD #5, Box 51A
Waynesburg, PA 15370
(412) 627-5640

Koppers Co., Inc.
950 Koppers Bldg.
Pittsburg, PA 15219
(412) 227-2404

Live-wire Products
P.O. Box 53
Sherman Mills, ME 04776
(207) 365-4438

Margo Supplier, Ltd.
Wildlife Control
Site 20, Box 11, R.R. 6
Calgary, Alberta T2M 4L5
Canada (403) 285-9731

Premier Sheep Supplies
RR 1, Box 159
Washington, IA 52353
(319) 653-3128

Shock Tactics Electric Fence Sys.
Waterford Corporation
216 Commerce Dr., P.O. Box 1513
Fort Collins, CO 80524
(800) 525-4952

Snell Systems, Inc.
18940 Redland Rd.
San Antonio, TX 78259
(800) 531-5908

Tech-Fence Division
Multi-Tech Industries, Inc.
P.O. Box A, 64 South Main St.
Marlboro, NJ 07746
(800) 431-3223

Walnut Grove Farm
c/o John & Laura Gund
50 Cartland Road
Lee, NH 03824
(603) 659-2044

Wellscroft Farm
c/o Dave & Deborah Kennard
46 Sunset Hill - Chesham
Marlborough, NH 03455
(603) 827-3464

West Virginia Electric Fencing
Rt. 81, Box 47
Greenville, WV 24945
(304) 753-4387

Other Exclusion Devices

Bat Skat, Inc.
P.O. Box 2221
Williamsport, PA 17703-2221

Pertrochem Corp.
101 Oliver St.
P.O. Box 1888
Paterson, NJ 07509
(201) 742-6468

3-E Corp.
401 Kennedy Blvd., P.O. Box 177
Sommerdale, NJ 08083
(Bat Exclusion)

Bat Area Bat Protection
1312 Shiloh Rd.
Sturgeon Bay, WI 54235
(Bat Exclusion)

REPELLENTS

Animal Repellents, Inc.
P.O. Box 999
Griffin, GA 30224
(800) 241-5064
(Thiram)

Bonide Chemical Co.
2 Wurz Avenue
Yorkville, NY 13495
(315) 736-8231
(Thiram)

Chacon Chemical Corp.
2600 Yates Ave.
City of Commerce, CA 90040
(213) 721-5031
(Para-Dichlorobenzene)

Frank J. Curran Co.
8101 S. Lemont Rd.
Downers Grove, IL 60516
(312) 985-2400
(Naphthalene)

Deer-Away
McLaughlin Gormley King Co.
712 15th Ave NE
Minneapolis, MN 55413
(612) 379-2895

Dragon Chemical Co.
P.O. Box 7311
Roanoke, VA 24019
(703) 362-3657
(Tobacco dust)

Earl May Seed & Nursery Co.
208 N. Elm
Sheanandoah, IA 51603
(712) 246-1020
(Ziram)

J.C. Ehrlich Chemical Co.
State College Labs
840 William Ln.
Reading, PA 19612
(215) 921-0641
(Thiram, bone tar oil)

Faesy & Besthoff, Inc.
143 River Rd.
Edgewater, NJ 07020
(201) 945-6200
(Tobacco Dust)

Gustafson, Inc.
P.O. Box 220065
Dallas, TX 75222
(800) 527-4781
(Thiram}

Hopkins Agricultural Chem. Co.
P.0. Box 7532
Madison, WI 53707
(608) 222-0624
(Thiram)

IntAgra, Inc.
8500 Pilsbury Ave., South
Minneapolis, MN 55420
(612) 881-5535
(Putrescent whole egg solids)

Leffingwell Div., Uniroyal Chem.
111 S. Berry Street, P.0. Box 1880
Brea, CA 92621
(714) 529-3973
(Ammonium Soaps - Hinder)

Market-Tech Ind. Ltd.
80 Skyline Dr.
Plainview, NY 11803
(516) 433-2116
(Methyl nonly ketone)

M & T Chemicals
P.O. Box 1194
Rathway, NJ 07065
(201) 499-0200
(Biomet 12)

Miller Chemical & Fertilizer Corp.
Box 333
Hanover, PA 17331
(717) 632-8921
(Capsaicin)

Nott Manufacturing
Pleasant Valley, NY 12569
(914) 635-3243
(Thiram)

Petrokem Corp.
P.O. Box 1888
Paterson, NJ 07509
(201) 773-7770
(Thiram, napthalene)

Planttabs Co.
Box 397
Timonium, MD 21093
(301) 252-4620
(Thiram, bone tar oil)

Sudbury Labs. Inc.
6 October Hill Rd.
Holliston, MA 01746
(800) 343-9911
(Thiram, napthalene)

Wilbur-Ellis Co.
P.O. Box 1286
Fresno, CA 93715
(209) 442-1220
(Thiram)

PREDATOR CALLS/TAPES

Hoosier Trapper Supply, Inc.
1155 N. Matthews Rd.
Greenwood, IN 46143
(317) 881-3075

Southern Outdoor Supplies, Inc.
Rt. 3, Box 503
Bassett, VA 24055
(703) 638-4698

TRAPS

Bigelow Trap Co.
979 Milford Ave.
Marysville, OH 43040
(513) 642-6786
(Body grip)

BD Tru-catch, Inc.
Box 327
Dickenson, ND
(701) 225-0398
(Live trap)

Tru-Catch Traps
P.O. Box 816
Belle Fourche, SD 57717
(605) 892-4797

B-Kind Animal Control Equipment
Southeastern Metal Products, Inc.
1200 Foster St. NW, PO Box 93038
Atlanta, GA 30377
(404) 351-6686
(Live trap)

Duke Company
508 Brame Avenue
P.O. Box 555
West Point, MS 39773
(601) 494-6767

Hancock Trap Co.
Rt. 1, Box 38-2
Buffalo Gap, SD 57722
(605) 833-6530
(Beaver and otter live trap)

Helfrich's
Star Rt., Box 428
Milam, TX 75959
(409) 625-4243
(Leghold)

Holdzem Trap Division
Oberlin Canteen Co.
212 Sumner St., P.O. Box 208
Oberlin, OH 44074
(216) 774-3391
(Live trap)

Ketch-All Co.
2537 University Ave.
San Diego, CA 92104
(619) 297-1953
(Live trap)

M&M Fur Co.
Box 15
Bridgewater, SD 57319-0015
(605) 729-2535
(Break-way snares & lures)

Meyer Manufacturing
Box 153
Garrison, IA 52229
(800) 255-2255

Mustang Mfg. Co.
P.O. Box 10947
Houston, TX 77018
(713) 682-0811
(Live trap)

Nash Mole Trap Co.
5716 East "S" Avenue
Vicksburg, MI 49097-9990
(616) 323-2980
(Mole trap)

Northwoods Wildlife Mgt. Equip.
P.O. Box 375
Greenburg, PA 15601
(412) 832-9759
(Leghold, body grip)

O'Gorman Enterprises, Inc.
Box 419
Broadus, MT 59317
(406) 436-2234

Safe-N-Sound Live Traps
P.O. Box 52, Highway 175
Morrison, IA 50657
(800) 648-CAGE
(Live trap)

Seabright Enterprises, Ltd.
4026 Harlan St.
Emeryville, CA 94608
(415) 655-3126

H.B. Sherman Traps, Inc.
P.O. Box 20267
Tallahassee, FL 32316
(904) 562-5566

H.J. Spencer & Sons
P.O. Box 131
Gainesville, FL 32602
(904) 372-4018
(Live trap)

Stendal Products, Inc.
986 E. Laurel Rd.
Bellingham, WA 98226
(206) 398-2353
(Live trap)

Sullivans Sure-Catch Traps
Box 1241, 2324 S. Patterson
Valdosta. GA 31601

Tomahawk Live Trap Co.
P.O. Box 323
Tomahawk, WI 54487
(715) 453-3550

P-W Manufacturing Co.
610 High Street
Henryetta, OK
(Death-Klutch Gopher/Mole Trap)

Trap-Ease, Inc.
3001 Redhill Ave., Bldg. 4, Ste. 120
Costa Mesa, CA 92626
(714) 979-5445
(Live trap)

Woodstream Corp.
Lititz, PA 17543
(717) 626-2125
(Body grip, leghold, live trap)

APPENDIX 21 *(1 page)*

Aircraft Wildlife Hazard Information on the Internet

The following is a list of internet websites that post information regarding wildlife hazards at airports. They may serve as a useful reference for airport managers wishing to learn more about wildlife strike rates, wildlife hazard management, and pertinent federal regulations regarding wildlife hazards.

Aerodrome Wildlife Control http://www.tc.gc.ca/aviation/aerodrme/birdstke/main.htm

Website maintained by Transport Canada which covers a wide range of airport wildlife hazard issues including background information and specific techniques for managing wildlife. Includes Transport Canada's entire Wildlife Control Procedures Manual online. Excellent source of information.

Bird Strike Committee USA http://www.birdstrike.org/

Website maintained by Bird Strike Committee USA which highlights background information regarding wildlife aircraft hazards and talks about upcoming meetings. Also has useful links to other pertinent websites.

Bird-Other Wildlife Strike Report http://www.faa.gov/arp/birdstrike/

FAA Form 5200-7 for reporting wildlife strikes online. Maintained by the FAA.

Wildlife Aircraft Hazards (FAA) http://www.faa.gov/arp/hazard.htm

FAA website containing documents in pdf format regarding federal aviation regulations, advisory circulars, and information concerning wetland mitigation on airports. Also contains links to other websites.

Wildlife Services http://www.aphis.usda.gov/ws/

Official website of the USDA, APHIS, Wildlife Services program. Contains sections on the Mission, Goals, Organization, and Information provide by the WS program. Some general information regarding WS assistance at airports. Contains links to other federal agency websites.