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Safety

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH) MANAGEMENT TECHNIQUES

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This pamphlet provides guidance for implementing an effective bird/wildlife aircraft strike hazard reduction program. This pamphlet provides additional information on BASH as specified in AFI 91-202, *The US Air Force Mishap Prevention Program* and AFI 91-204, *Safety Investigations and Reports*. This pamphlet applies to all Air Force personnel, Air National Guard and US Air Force Reserve units, and members (excluding Aero Clubs) who plan, support, or are engaged in flying operations. This pamphlet implements the requirements of AFPD 91-2, *SafetyPrograms*. Records Disposition. Ensure that all records created by this AFPAM are maintained and disposed of IAW AFMAN 37-139, "Records Disposition Schedule".

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

This revision updates the term BASH to include all wildlife hazards to aviation safety and now defines BASH as Bird/Wildlife Aircraft Strike Hazard. The following new paragraphs were added: **1.4.4.**, **1.4.5.**, **2.2.2.4.**, **2.2.4.4.**, **2.2.4.5.**, **2.3.9.**, **2.4.**, **2.5.2. 2.5.4.1.**, **2.5.4.5.**, **2.5.4.5.2.**, **2.5.4.5.3.**, **2.5.4.6.**, **2.6.4.**, **Attachment 6**, and **Attachment 7**. Major revisions were made to the following paragraphs: **1.3.2.**, **2.2.**, **2.2.1.**, **2.2.3.**, **2.2.3.1.**, **2.2.4.2.**, **2.2.4.3.**, **2.2.6.**, **2.3.1.1.**, **2.3.1.5.**, **2.5.4.**, **2.5.4.4.**, **2.5.4.4.2.**, **2.5.4.4.3.**, **3.11.**, **3.14.**, and **Attachment 2**, **Attachment 3**, **Attachment 4** and **Attachment 5**. Paragraph 2.4.3.10. was deleted.

Chapter 1

BASH REDUCTION PROGRAM

1.1. General Background:

1.1.1. Aircraft collisions with birds and other wildlife annually cause millions of dollars in aircraft damage and may result in loss of aircraft and aircrews. However, procedures to reduce these losses are available. Reduction of strike hazards may be divided into four categories: Awareness, Control, Avoidance and Aircraft design. Wildlife strike hazards to aircrew and aircraft may be significantly reduced using a combination of the methods listed above. This may result in substantial savings of Air Force resources.

1.1.2. The Bird/Wildlife Aircraft Strike Hazard (BASH) Team was formed to coordinate efforts in all areas. The BASH Team assists Air Force organizations worldwide to reduce the risk of bird strikes and collisions with other animals, such as deer. The BASH Team is located at Headquarters Air Force Safety Center (HQ AFSC/SEFW; 9700 G Avenue SE, Suite 266; Kirtland AFB, NM 87117-5670). More information about the BASH Team and related topics can be found at the following website: **http://safety.kirtland.af.mil/afsc/bash/home.html**

1.2. Basics for a Program:

1.2.1. Local conditions that enhance the potential for wildlife/aircraft strikes vary at each installation. Birds may flock to airfields or cause hazards en route; hazards may be seasonal or year round. Wildlife activity varies as local conditions change from crop selection, land use choices such as a landfill operation, or creation of a wildlife refuge. Base-level personnel must remain vigilant of such attractants and be aware of proper wildlife control techniques. Installations experiencing these problems should first contact their respective MAJCOM for assistance. The base may also contact the jurisdictional agency for proper coordination to assure compliance with state or federal regulations. Where appropriate, AFSC/SEFW may provide additional assistance to resolve or reduce these potential hazards. The contacts mentioned above may suggest proven methods for wildlife dispersal, avoidance procedures, or recommend land management techniques that discourage wildlife activity from the airfield.

1.2.2. Required time and effort necessary to maintain a safe airdrome will depend upon the severity of the wildlife strike hazard and how well base personnel are prepared to reduce these hazards. The key to a successful BASH reduction program is participation by well-trained individuals assigned specific tasks. Wildlife strikes can never be eliminated; but, an aggressive, well-planned program developed on the basis of wildlife habits, the environment, and the base mission may limit the potential for these strikes to occur. The following are guidelines for BASH reduction programs.

1.3. Developing a Program:

1.3.1. Bird/Wildlife Hazard Reduction Plans. A well written, workable BASH plan is the key to reducing strike hazards and ensures continuity of knowledge with personnel turnover. If needed, a sample BASH plan may be obtained from MAJCOM Flight Safety offices. Plans should be tailored to meet the specific hazards encountered locally. Integrate all habitat modification procedures making sure natural resource plans are compatible with base BASH program plans. As a minimum this plan should: inform new personnel of local hazards; identify local conditions on the airfield attractive to

wildlife and cite measures to reduce these attractions (e.g., long grass, insect reduction, water drainage); outline bird dispersal procedures and OPR; and specify base bird watch condition codes (see **Attachment 1**), location where daily code will be displayed, implementation procedures, authorization for declaring codes and flight operations under specified bird watch condition codes.

1.3.2. Bird Hazard Working Group (BHWG). The BHWG normally consists of representatives from flight safety, airfield management, base operations, air traffic control, civil engineering, aircraft maintenance, public affairs, and base legal. The base Natural Resource Manager and base Wildlife Biologist should also attend. Other representatives such as the golf course manager, munitions or civilian operations personnel may be included based on BHWG issues. The group's purpose is to assist the safety office in drafting and implementing the Bird/Wildlife Hazard Reduction Plan. Meetings are held IAW AFI 91-202, *The Air Force Mishap Prevention Program*, but may be called more frequently or as conditions dictate. BHWG meeting topics should include but are not limited to: USAF reported wildlife mishaps and incidents; USAF BASH Team information updates; locally observed/reported wildlife activity, to include LL ranges/routes, airfield inspections/surveys, recovered wildlife remains, wildlife strikes; local wildlife habitat management/modifications, to include dispersal/depredation activity, environmental/land management activity, land uses (landfills, agriculture crop seasons); BASH-related budgeting issues; annual bird migrations; local BASH plan procedures and responsibilities, to include observed effectiveness/deficiencies; BASH awareness training/education, to include BWC code definitions and communications; flying schedule and wildlife activity conflicts; BASH self-inspection checklist; status of bird dispersal supplies; and/or a review of FliP documents for wildlife advisories (Phase I / II designations).

1.3.3. Base Self-Inspection Checklist. A BASH self-inspection checklist is a useful tool in identifying deficiencies in BASH reduction plans. A sample checklist is provided as **Attachment 2**.

1.4. Documenting Bird Hazards:

1.4.1. Evaluating an airfield for wildlife hazards involves the identification of local wildlife activity periods, species causing hazards, locations of favorable habitat, and documenting this information into daily activity surveys. When information is compiled over several seasons or years, to include night and day surveys, development of a more effective wildlife hazard reduction program is possible. The wildlife surveys should include: date and time; weather conditions; wildlife species of concern; favorable habitat locations on the airfield; wildlife movement corridors (soaring to and from roosts, feeding, etc.); wildlife activities (loafing, feeding, drinking, etc.); potential attractions; wildlife responses to mowing; and/or land uses adjacent to base property (planting/plowing etc.).

1.4.2. Documenting the local wildlife problem, technical assistance received, and the successes of solutions tried are essential parts of any wildlife hazard reduction program. Complete documentation is necessary to acquaint new personnel with the problem and may be required in any civil litigation regarding the resolution of a wildlife hazard. Documenting the use of non-lethal techniques may also be necessary to obtain permits to take lethal action, if needed, to resolve an extreme hazard.

1.4.3. Photograph and summarize all hazardous situations wildlife create on base. For example, pictures of gulls loafing on the airfield accompanied by observations showing the birds using a nearby sanitary landfill can provide a strong case against future expansion of the landfill. Good documentation gives credence to the problem and shows solutions are being considered.

1.4.4. Report all wildlife strikes, both damaging and non-damaging, on the Air Force Safety Automated System (AFSAS) IAW AFI 91-204, *Safety Investigations and Reports*. The unit owning the mishap aircraft's flying hours must file the report. Additionally, any wildlife remains found on the runway and believed to have been involved in a strike must be documented via AFSAS. AFSAS can be accessed online through the Air Force Safety Center's homepage. This automated system will walk the reporting individual through the necessary steps to file a report.

1.4.5. Proper species identification of wildlife is an integral part of a BASH program. Feather remains from every bird strike, if available, must be sent to the Smithsonian Institution National Museum of Natural History for identification IAW AFI 91-204.

Chapter 2

AIRFIELD HAZARD CONTROL METHODS

2.1. Introduction to Airfield Wildlife Control. Active and passive techniques can successfully reduce threats from hazardous wildlife populations. These techniques vary in cost and effectiveness depending on the situation. Active control involves causing wildlife to disperse from an airfield to give short-term relief from an immediate safety hazard. Passive techniques are more long-term in nature. They involve managing the airdrome to eliminate or reduce those conditions birds and other wildlife find attractive.

2.2. Active Controls. Birds and other hazardous wildlife on runways, taxiways, or infields create a potential safety hazard and should be dispersed before flying operations can safely continue. Birds move quickly and unpredictably. Even when left in a "safe" portion of the airfield, they can move and create an immediate hazard. They may also act as decoys attracting additional birds. No single method of dispersal works for all problems. Using a combination of different dispersal tools, also known as integrated pest management, provides the best line of defense for immediate hazards. Pyrotechnics, bioacoustics, depredation, and other methods have been effective in dispersing wildlife from airfields. When used together, or in an alternating manner, these techniques remain more effective over a longer period. A depredation permit is not required for non-lethal harassment of migratory birds on the airfield IAW 50 CFR 21.41 *Migratory Bird Depredation Permits*. Authorized BASH equipment is listed in **Attachment 5**.

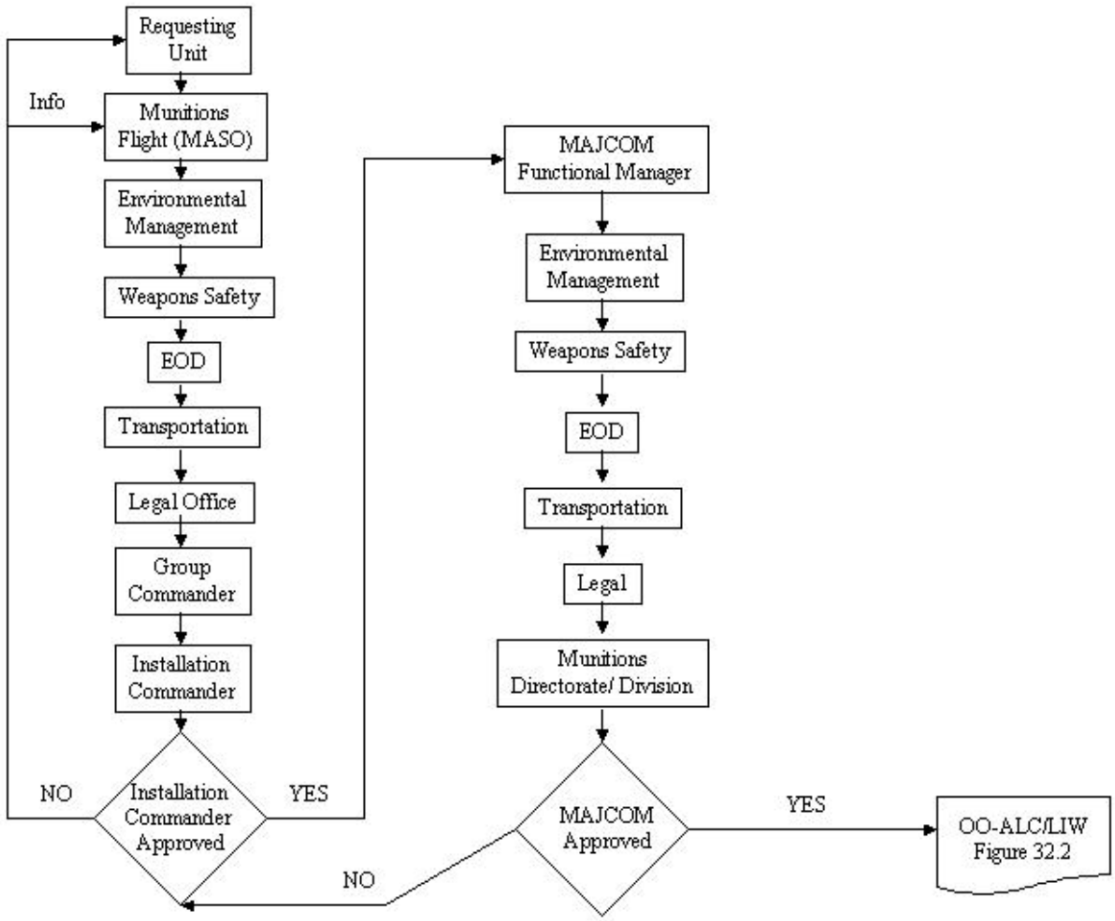
NOTE: The key to active wildlife dispersal is perseverance. When birds or other wildlife are strongly attracted to an airfield, several teams may be required to provide continual harassment. Usually, a single trip around the airfield will not remove all the birds.

2.2.1. **Pyrotechnics.** Pyrotechnics are noise-producing devices, which are effective in bird dispersal. Scare cartridges, a commercially available pyrotechnic, fired from a 12-gauge shotgun or an NJ-8 Very Pistol [with a locally manufactured steel sleeve insert (technical order (TO) 11W2-9-2-31)], are authorized. The 12-ga scare cartridge is an explosive charge fired 50 to 100 meters. At this distance, it detonates producing a loud noise. Two types of 15mm scare cartridges are also authorized, bangers and screamers. The bangers do not have the range of the 12-ga cartridges but it and the screamer are fired from a 15mm launcher, which is not considered a weapon. The 15mm banger provides a loud report, whereas the screamer makes a shrill whistle. Both are effective and inexpensive bird dispersal tools at moderate distances. Pyrotechnics can be used to flush and direct flocks of birds in a desired direction. For example, if a flock of gulls is feeding near an active runway, a scare cartridge exploded between the birds and the runway will usually cause the birds to fly away from the source of the noise and not pass over the runway. Close coordination with the control tower is essential so birds are not directed into the path of arriving or departing aircraft. Always advise base security forces before pyrotechnics are used. The base agency storing and using pyrotechnics must follow guidelines outlined in AFI 21-201, *Management and Maintenance of Non-Nuclear Munitions* and AFMAN 91-201, *Explosives Safety Standards*. Since harassment constitutes a "taking" for purposes of the Endangered Species Act, the US Fish and Wildlife Service (USFWS) must be consulted prior to the use of pyrotechnics if their use will affect any such Federal threatened/endangered species.

2.2.1.1. Authorized BASH munitions fall into two categories, centrally managed and commercial-off-the- shelf (COTS). Centrally managed items are ordered through the base supply system. COTS items can be purchased using the IMPAC card. AFI 64-117, *Air Force Government-wide Purchase Card Program* authorizes the purchase of BASH munitions with the IMPAC card (para-

graph 2.4.7.). “To purchase COTS explosives and munitions, requesting unit will coordinate a package, using an AF Form 1768, Staff Summary Sheet, through the installation Munitions Accountable Supply Officer, Environmental, Safety, EOD, Transportation, and Legal agencies for Group and Installation Commander approval” IAW AFI 21-201, paragraph 32.3.1. AFI 21-201, Figure 32.1 depicts the coordination process as:

Figure 2.1. COTS Coordination Process.



2.2.2. **Bioacoustics.** This dispersal technique uses broadcasts of recorded bird distress calls. Depending on the species, the calls may create differing responses; some will come to the calls while others may depart the area. For this reason, the sound source must be properly placed so the birds fly away from the runway. As with pyrotechnics, if the use of bioacoustics will have an impact upon a federally listed threatened or endangered species, the USFWS must be consulted prior to use.

2.2.2.1. Broadcast distress calls may be used with a vehicle equipped with a sound system producing 30 to 50 watts of distortion-free sound in 90 to 100 decibel (db) with a frequency response between 12,000 and 14,000 Hertz (Hz). A speaker is mounted on the vehicle. The operator identi-

fies the birds to be dispersed and selects the appropriate distress call tape. The vehicle is driven as close as possible to the birds. Depending on physical factors such as terrain, trees, and structures on the airfield, the distance from the problem birds will vary. Employ bioacoustics 100 to 200 meters as the maximum distance from birds to achieve the desired results. The distress call is then played for 15 to 20 seconds. If the birds have not moved within 20 seconds, play the call again. If they have not moved by the third attempt, other methods are required.

2.2.2.1.1. There are four important points to remember when using bioacoustics. 1) Try to identify the bird species you wish to disperse and use that species' distress call. However, a variety of calls may be tried to determine the most effective selection for a particular pest. Some bird species do not respond to distress calls. 2) Make sure the vehicle is stopped when the distress calls are played. Birds need to identify the source of the disturbance before they can react. 3) Do not allow the distress calls to play indefinitely because birds can become accustomed (habituate) to them. 4) The effectiveness of distress calls is dramatically increased when combined with other frightening techniques, especially pyrotechnics.

2.2.2.2. Distress calls have limited use in many situations. Not all birds are affected by bioacoustics. Birds often react to the calls by flying toward the source, circling it, and gradually moving away. This takes time and may create a momentary hazard. Combining bioacoustics with pyrotechnics can best disperse these birds. The distress call is played to get the birds in the air, then, pyrotechnics are used to disperse them. Hazards to flying operations can be alleviated by using these techniques before flying begins or during breaks in flight activities.

2.2.2.3. Gulls, starlings, blackbirds, and crows can be effectively dispersed with distress tapes. Occasionally, recorded distress calls of different bird species will frighten a variety of birds; however, species-specific distress calls are the most effective.

2.2.2.4. Tapes or digital recordings of distress calls are difficult to find and therefore bioacoustics may be of limited usefulness. Distress calls are now being incorporated into multi-functional bird scare systems

2.2.3. **Depredation.** Bioacoustics and pyrotechnics provide good wildlife control in most situations. Yet, some species may grow accustomed to these techniques, and a few individuals may have to be taken via lethal means to reinforce the idea that a significant danger exists. A federal depredation permit, available from the U.S. Fish and Wildlife Service (USFWS), is required before killing any protected birds. The application for the depredation permit is a USFWS Form 3-200-13, *Federal Fish and Wildlife License/Permit Application Form,* and must be accompanied by the information requested by the USFWS information sheet 50 CFR 21.41. A copy of the permit must be carried whenever exercising its authority. Birds may only be killed in conjunction with a continuing non-lethal control program. Unless otherwise directed, carcasses, nests, and eggs shall be completely destroyed or incinerated. No federally listed threatened or endangered species, Bald or Golden Eagles, or their nests and/or eggs are authorized. European Starlings (*Sturnus vulgaris*), House Sparrows (*Passer domesticus*), and Rock Doves/domestic pigeons (*Columba livia*) are not federally protected in the United States and require no federal depredation permit. When granted, the permit will specify the species, the numbers of birds that can be taken, and the technique to be used.

NOTE: Anyone participating in the base depredation program should attend and receive certification through a hunter's safety or gun handling safety course. Contact the base rod and gun club or MWR for

information on base organized hunter safety programs, or contact the local game agency and their administrator for hunter safety courses in the area.

2.2.3.1. **Airport Permits.** The USFWS is adding an additional clause on depredation permits for airports in some regions. This clause would allow airports to kill, capture, or relocate up to ten (10) migratory bird species on an emergency basis. An emergency is defined as an immediate danger to public safety and/or an immediate hazard to aircraft. Any emergency activity must be reported to the depredation permit issuing office within 24 hours. This emergency clause is only approved in certain regions, so contact the depredation permit issuing office before taking any actions.

NOTE: Some states may require additional permits for the take of State protected species. These may be coordinated with the USFWS as well. Coordinate with the base environmental flight and legal offices when obtaining permits.

2.2.4. **Other Wildlife Control Methods.** Other active control methods listed on the next page may be effective.

2.2.4.1. **Propane Gas Cannons.** These devices should be operated, especially at dawn and dusk, as birds come in to feed or roost. Cannons must be relocated frequently to avoid habituation problems. Continuously operating cannons quickly leads to habituation, rendering the cannons ineffective. These devices may be effective on gulls, blackbirds, waterfowl, pheasants, and other game birds when used in conjunction with other harassment techniques or depredation.

2.2.4.2. **Falconry.** A falconry program is not limited to the use of falcons only but can incorporate several species of birds of prey. Falcons trained for airfield bird dispersal may be effective when used in combination with other frightening techniques. Deploying birds of prey usually disperses birds immediately from the airfield and these birds are likely to remain away from the airfield for longer periods. Birds of prey inherently scare other birds so there is little habituation of the "prey" to the threat. In adding this tool to your harassment arsenal, you also get the benefit of the bird handlers' knowledge of birds and their behavior. However, there are limitations to falconry. A falconry program can be very expensive, labor intensive, and there is some potential for bird strikes with the falconry birds. Falcons can be flown only during daylight hours in good weather, and they cannot be flown when molting or after feeding. In order to adequately cover all flying operations at an airfield, multiple handlers and birds will have to be employed, hence the high expense. Also, most birds of prey typically used in falconry programs are ineffective in dispersing large waterfowl, particularly geese, and other birds of prey from an airfield.

2.2.4.3. **Dogs.** The use of Border Collies or other breeds of dogs to disperse geese has been effective under certain circumstances. A dog demands full-time attention, especially Border Collies, making it more advantageous to contract the services of a dog and its handler rather than purchasing a dog. While a dog may be very effective at dispersing geese from an airfield it may prove ineffective at removing geese from bodies of water or other species of birds from the airfield, especially gulls.

2.2.4.4. **Radio Controlled Crafts.** Use of radio controlled aircraft, dune buggies, or boats to disperse birds have shown significant results. The airplane can guide the birds in a flight path away from the airfield and offers continued harassment while the birds are in flight. Radio controlled boats can harass birds on large ponds where pyrotechnics cannot reach out and touch the birds.

Cars can effectively disperse birds from grassy areas; particularly office buildings or housing where the use of pyrotechnics or gas cannons is not desirable.

2.2.4.5. **All-Terrain Vehicle (ATV).** Use of all terrain vehicles in the airfield environment has proven useful in dispersing birds and other wildlife from the aircraft operating area. Many airfields have areas, which are difficult to navigate, even with 4x4 vehicles. The ATV can operate in any area to get the birds in the air and supplementing with pyrotechnics once airborne can further disperse them. However, before operating an ATV, personnel must complete an ATV rider safety course IAW with AFI 91-207 which requires that ATV training will be acquired by a certified Specialty Vehicle Institute of America (SVIA) before operating an ATV.

2.2.5. **Ineffective Methods of Control** :

2.2.5.1. Stuffed owls and rubber snakes have been advertised to rid hangars and buildings of birds. They are usually a waste of money and effort.

2.2.5.2. Rotating lights have brought conflicting results; but are generally considered ineffective. Birds quickly habituate to these devices, and the problem remains unsolved.

2.2.5.3. Eyespots on aircraft components are being studied in the United States and other countries. Early results suggest the addition of eyespots does not significantly reduce the BASH potential.

2.2.5.4. Ultra-sonic devices have thus far proven unsuccessful in deterring wildlife from colliding with aircraft. Very few bird species can hear ultra-sonic sound. Of the bird species most often struck on airfields, most cannot detect the presence of ultra-sonic sound, therefore rendering these devices useless for dispersing birds on an airfield.

2.2.6. **Personnel and Equipment.** Each installation with a BASH program should designate and train personnel in wildlife dispersal regardless of the severity of the hazard present on the airfield. In many instances, the presence of hazardous wildlife is a transient condition and may only require active dispersal for short periods throughout the year. Dispersal equipment should be located in the same area as the personnel tasked with wildlife control so it is readily available when hazards arise. If a 15 mm launcher is used, no storage problems should arise. If a Very Pistol with a 12 gauge sleeve is used, the pistol will most likely have to be stored in the armory or in a licensed storage area. AFI 91-201 provides guidance on licensing requirements. Installations subject to deployment should include bird dispersal equipment for such contingencies (see **Attachment 7**). Each installation should designate individuals responsible for wildlife dispersal during deployments and properly train these personnel. Additionally, installations should document the training of the aforementioned personnel.

2.3. Passive Controls. The most permanent methods of discouraging birds from using airfields involve removing attractive habitat features. Methods to reduce bird attractants include:

2.3.1. **Grass Management.** As a minimum, address the following factors:

2.3.1.1. **Grass Height.** Maintain airfield vegetation IAW AFI 91-202. Coordinate mowing with periods of low flight activity. While maintaining the grass height at 7-14 inches, make sure faster growing weeds are cut before they go to seed to discourage seed eating birds from using the airfield. Primary focus should be on the grass height and weed seed heads. Grass between 7-14 inches discourages flocking species from foraging on the airfield because reduced visibility disrupts inter-flock communication and flock integrity by reducing the ability to detect predators.

Grass exceeding 14 inches (36 cm) will attract some bird species and rodents, which in turn attract raptors. Airfields with a variety of grass species should be mowed when the average grass height, not including seed heads, exceeds tolerances. Most grass seeds found on the airfield are less desirable as food than available weed seeds. Although Bahiagrass and some other turf grasses produce prominent seed stalks, the height of these seed heads should not be the sole reason for mowing. As turf grass will eventually go to seed, mowing to eliminate seeding will increase mowing cycles. Eliminating weeds and cultivating a uniform monoculture of grasses can be more effective in discouraging seed-eating birds from feeding on the airfield than mowing grass seed stalks. Begin mowing adjacent to runways and finish in the infield or outer most grass areas. This causes insects and other animals to move away from aircraft takeoff and landing areas. Also, avoid mowing grass shorter next to the runway than in other areas, as much as possible.

2.3.1.2. **Herbicides and Growth Retardants.** Keep broad-leafed weeds to a minimum on the airfield. Apply herbicides as practical to control weeds and comply with AFI 32-1053, *Pest Management Program*. Broad-leafed weeds attract a variety of birds, may produce seeds or berries, and may limit grass growth. Growth retardants should be tested on small test plots before use on areas in general.

2.3.1.3. **Planting Bare Areas.** Reduce bare areas as birds frequently use them to pick up grit and as resting sites on the airfield. Birds need grit, or very small rocks, to crush seeds, allowing digestion of the seeds. Eliminating bare areas on the airfield denies access to grit and forces birds seek sources elsewhere. Plant grass adapted to the area, add fertilizer and lime as necessary, and irrigate only until new grass is established.

2.3.1.4. **Fertilizing.** Fertilize as needed to stimulate grasses and promote a uniform cover. Rate and frequency of application may vary from that of other semi-improved grass areas and should be based on soil test results.

2.3.1.5. **Native Vegetation.** In geographic locations where conditions do not support turf growth, such as in desert environments, it may be advisable to allow native vegetation to remain in a natural state (above or below the prescribed height of 7 – 14 inches) as disturbance may provide exotic conditions attractive to some forms of wildlife. The natural state must not supply attractive habitat for wildlife or obstruct views of the airfield from the tower. Another consideration for airfields in low-moisture environments is to consider de-vegetation as an option.

2.3.2. **Managing Reforested Areas** : Site commercial forest areas so as not to contribute to the installation BASH problem. The types of trees planted for forest production are often different than those in the surrounding community and may serve as bird roosting sites. For example, the dense canopy of a planted pine forest in a hardwood region may provide ideal roosting sites. Thinning the roosting area can usually discourage the roosting behavior (removing certain trees to produce an open stand canopy). If necessary, remove all trees from the site and grass and maintain the area with other airfield turf areas. Should a stand of trees contain birds protected by the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act or any other species protected by the Endangered Species Act, the USFWS should be contacted to determine whether an incidental-taking permit is required prior to any tree removal. Federal law clearly indicates that the destruction of wildlife habitat can be tantamount to a taking of protected species and, in some instances, may not be allowed.

2.3.3. **Landscaping.** Shrubs, ornamental trees, shelterbelts, hedgerows, and noise suppression barriers are important plantings on a base. However, the airfield and clear zones are not proper places for

landscape plantings. These types of vegetation can influence wildlife populations and their movements around the base. Trees often intermingle as they mature, forming a continuous canopy. This close, dense foliage attracts birds and is ideal for providing shelter, food, and nesting. Proper planning can reduce these potential attractants. When planting shrubs, select those species that do not produce fruit, especially during the winter. Ripe berries attract birds for short periods each year. Blackbird and starling roosts are particularly hazardous because of the large number of birds (often numbering in the millions) that may be present in a single roost. Birds can usually be stimulated to move by pruning and thinning trees and shrubs to open the canopy. In some situations, it may be necessary to remove all the plants. Trees and shrubs should not be allowed to grow in the infield areas.

2.3.4. **Removal of Edge Effects.** The greatest numbers of species are found where vegetation types change from forests to brush, or brush to grass (edge effects). To reduce wildlife problems, keep edge effects to a minimum, or as far from the active runway as possible. If an airfield has clumps of brush and shrubs around the grass, more diverse habitat is available. Remove brush and weeds to maintain the airfield in the most uniform condition possible. This eliminates the cover many birds and rodents require. Single trees or snags on an airfield may provide perches for hawks, owls, or other bird species. Biodiversity practices should not be implemented on airfields.

2.3.5. **Controlling Drainage.** Fresh water is one of the most important airfield wildlife attractants, especially in arid regions and near the seacoast. Standing water creates a source of drinking water and a breeding place for insects, amphibians and other food sources for birds. Mark areas of the airfield with chronic standing water after heavy rains. Coordinate with CE or EM to fill, level, and re-seed these areas with grass to match the rest of the airfield. Since federal and state laws strictly control wetlands, coordination with CE or EM is a must before making any modifications to airfield drainage. However, non-tidal drainage and irrigation ditches excavated on dry land are not generally considered to be "waters of the United States" (51 FR 41206, *Final Rule for Regulatory Programs of the Corps of Engineers*) and therefore are not considered wetlands. Make airfield drainage ditches as deep as possible to limit the surface area of the water and still allow proper drainage according to civil engineering requirements. Wading birds, such as herons, egrets, and shorebirds, are less likely to use deep drainage ditches. Grade the banks of the drainage ditches to allow mowing up to the edge of the ditch. Keep drainpipes, culverts, and screens clear of debris so drainage is not impeded.

2.3.6. **Locating Wastewater Treatment Facilities.** Waterfowl and shorebirds are often attracted to wastewater holding ponds. Birds use the water for resting and sometimes as a food source. Wastewater lagoons are most attractive in arid climates. Ponds designed with steep sides, little surface area, and no vegetation reduces the attraction to birds. Locate ponds as far from the runway and associated traffic patterns as possible and place them so birds moving from off-base areas to the ponds do not cross the runways.

2.3.7. **Managing Sanitary Landfills** :

2.3.7.1. **On-Base Landfills.** Municipal solid waste (MSW) landfills are the most significant attractant to hazardous bird species. Operate disposal sites according to FAA guidelines and state and federal laws. Relocate landfills that do not meet FAA guidelines criteria. If landfill relocation is not feasible, make the site as unattractive to birds as possible. Consider the following methods: Maintain a small working face to minimize exposed wastes; incinerate waste; operate the landfill as a pit or trench to limit access to birds; dump waste at night or during non-flying periods; cover waste material immediately; discourage gulls and other birds with overhead wire barriers; relocate

putrescible wastes to a more remote landfill; and use bioacoustics and pyrotechnics to frighten birds away.

2.3.7.2. **Off-Base Landfills.** The Air Force cannot control land use off-base; however, before landfills can be opened, the operator must obtain a state permit. A hearing is held about the potential environmental impact. Air Force concerns about potential bird hazards should be expertly presented at these hearings. Flight safety, environmental planning, public affairs, and the staff judge advocate should work jointly to present Air Force interests. HQ AFSC/SEFW will assist by providing consultation and expert testimony as needed.

2.3.8. **Managing Agricultural Outleases.** Many bases have agricultural programs on their airfields to reduce maintenance costs. These programs range from crop and hay outleases to grazing and reforestation. The types of crops grown and the agricultural methods used have important effects on local bird populations.

2.3.8.1. Grain crops within 1,000 feet of the runways are not recommended because harvest methods expose a ready food supply. Hay, cotton, and flax are the least attractive crops. Airfield crops should not be radically different from crops found in the surrounding community. Anything that makes the airfield unique can attract birds and other wildlife. Cultivation may attract birds by exposing large numbers of insects and earthworms.

2.3.8.2. Harvesting and planting schedules can also affect the numbers of birds the airfield attracts. For example, if an airfield hay crop is harvested before or after other hay crops in the region, large numbers of invertebrates may be exposed on the airfield that are not exposed in other fields. This might provide a more intense bird attractant than would usually exist.

2.3.8.3. Agricultural activities should also consider the local flying schedule. Planting, cultivating, harvesting, or burning may temporarily increase airfield bird attractants, therefore should be done on weekends or other periods of reduced flying. Both airfield management and civil engineering personnel (AFI 32-7064, *Integrated Natural Resources Management*) should closely monitor agricultural practices used in base agricultural outleases.

2.3.8.4. Grazing animals can be a serious hazard. Ensure the use of strict animal control and proper fencing.

2.3.9. **Fencing.** Proper fencing can reduce airfield incursions by wildlife other than birds. An 8-foot chain-link fence topped with outward-facing outriggers and 3 strands of barbed wire will normally be enough to deter most encroachments by deer, coyotes, and other such large animals. The bottom of the fence must be properly secured at or underneath the ground to prevent animals from digging or pushing under the fence. Another option is an electric fence. Though cheaper than a chain-link fence, an electric fence requires more maintenance and management over the long-term. Ensure that all fences are properly closed when not in use and they do not violate the airfield clear zones and frangibility rules.

2.4. Hangars. Hangars provide a good environment for birds to nest and roost. Without much threat from predators and a relatively quiet habitat at night, certain species of birds will take up residency in hangars. In addition to health risks resulting from bird scat and bird mites, the close proximity of hangars to the airfield environment requires attention be given to any birds making a hangar their home. Hangars are easily accessible to birds since the doors are usually left open for long periods, particularly in the evenings when birds are roosting. Denying birds access to the hangar by keeping the doors closed is the best prevention

method but is not practical so either exclusion devices or full-time bird control are necessary inside the hangar.

2.4.1. **Netting.** Though expensive, provides an excellent long-term defense against birds returning to hangars. Netting will prevent birds from roosting inside the hangar while allowing the doors to be open during hangar operations.

2.4.2. **Air Rifles.** Use of air rifles to disperse birds in hangars has proven successful in removing birds. When dealing with a roosting flock of pigeons, starlings or House Sparrows, an air rifle is probably the least expensive control technique. These species are common nuisances in hangars and are not afforded any Federal legal status because they are non-native or "introduced species." But this does *not* mean there are no state or local restrictions. Before shooting *any* bird, it is wise to check for any applicable state or local laws that may prohibit shooting them. At all times, be certain of the target species.

2.4.3. **Brush Weatherseals.** Using brush weatherseals on the edge of the doors or around windows will remove gaps and seal any open spaces, thereby restricting entry points to birds.

2.4.4. **Strip Curtains.** Strip curtains, or vertical blinds, allows the hangar doors to remain open for ventilation while limiting access to birds.

2.4.5. **PVC Pipes.** Lining the hangar rafters with PVC pipes have proven successful in keeping birds out of hangers. By reducing the amount of surface available for nesting or roosting, the birds are annoyed enough to look for other structures upon which they can build.

2.4.6. **Falconry.** Some birds of prey, Harris Hawks for example, can be very effective at ridding hangars of roosting birds. Consider the feasibility of including hangars in existing airfield bird control falconry contracts or establishing a falconry contract for hangars (reference Section **2.2.4.2.**).

2.5. Flight Operation Considerations:

2.5.1. When environmental modifications and active control measures do not satisfactorily reduce wildlife hazards on the airfield, flying operations may have to be altered to reduce the risk of bird strikes. As defined in AFI 91-202, Bird Watch Condition (BWC) Codes (see **Attachment 1**) may be a valuable tool for supervisors to make operational changes. These operational changes are dictated by the severity of the problem, the performance capability of the aircraft, and training or readiness requirements. Bird hazards, like any other safety hazards, must be assessed with respect to operational requirements. During contingency operations or advanced stages of readiness, bird hazards may have minimal safety priority. During training to maintain operational readiness; however, certain changes can be made to improve safety, reduce costly repairs, and protect aircrews.

2.5.2. Flying one hour before and after dawn and dusk should be avoided unless absolutely necessary. The highest levels of bird activity normally occur during these hours as birds leave and return to their roosts. Avoiding flight operations during these periods can significantly reduce the chance of a bird strike.

2.5.3. Knowledge of unit operational and training requirements, combined with an understanding of local flying restrictions, is necessary to properly evaluate possible modifications to local procedures.

2.5.4. The key to reducing bird strikes by changing flight operations is to avoid known locations, concentrations or movements of birds. The following recommendations can help reduce bird hazards by modifying operational procedures.

2.5.4.1. **Takeoff and Departure.** Aircraft making formation departures increase the risk of damaging bird strikes when birds are feeding or loafing on or near the runway. Formation and single-ship interval takeoffs often result in birds being scared up by the lead aircraft, causing the wingman to hit the birds.

2.5.4.1.1. When the lead aircraft scares up large flocks of birds, the wingman should delay departure until the birds are clear of the runway. Pilots of lead aircraft must be alert to warn the wingman of bird hazards during takeoff. This is especially important as the wingman's attention is focused on the lead aircraft.

2.5.4.1.2. When flocks of migratory birds are a problem, formation takeoffs and single-ship interval takeoffs with minimum spacing involving rejoins, increase the risk of serious bird strikes. All rejoins require greater attention by pilots to the lead aircraft's position. The increased speed required catching the lead aircraft after takeoff increases the risk of damaging bird strikes. When birds are known to be flying in the area, departures under visual meteorological conditions (VMC) may be modified to reduce the risks. Departures should be made in trail, with the rejoin beginning after the aircraft passes 2,000 to 3,000 feet above ground level (AGL). If aircraft are to enter a low-level route immediately or stay at an intermediate altitude for a prolonged period, tactical formation provides enough aircraft clearance to allow wingmen to stay clear of birds.

2.5.4.2. **Enroute Bird Strikes.** Aircrews experiencing enroute bird strikes should abort the mission when practicable. While some engine ingestions or a windscreen strike may be readily apparent from the flight deck, the damage from many engine, fuselage, wing, tail, or radome strikes cannot be adequately assessed. Continuing a mission may cause greater structural damage and lead to a serious in-flight emergency later.

2.5.4.3. **Low-Level Operations.** When flying low-level routes or operating in special use airspace, higher aircraft speeds and greater exposure within bird flight environments lead to many damaging bird strikes. During these flights, aircrews are involved in cockpit duties, allowing little time to monitor bird activity. "Heads-up" flying should be stressed as much as possible during these critical operations. **Attachment 3**, "Low-Level Flight Considerations," provides general guidance for bird avoidance during low-level flight operations.

2.5.4.4. **Low-Level Bird Avoidance Model (BAM).** The BAM is a predictive model using Geographic Information System (GIS) technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics, combined with key environmental, and man-made geospatial data. The value for each cell (or pixel) of the model is equivalent to the sum of the mean bird mass (in ounces), for all bird species present during a particular daily time period, for one of 26 two-week periods in a year. The bird species data set was derived from discrete geographic information for observations of 60 key BASH bird species, over a 30-year period. The species data was acquired from several key datasets, including the Audubon Societies' Christmas Bird Count (CBC), the US Biologic Survey's Breeding Bird Survey (BBS), bird refuge arrival and departure data for the conterminous US, and many additional data specific to a particular bird species.

2.5.4.4.1. The risk levels describe three predicted risk classes - Low, Moderate, and Severe, which are based upon the bird mass in ounces per square kilometer. In other words, the risk levels represent the amount of birds (bird mass) in a kilometer squared spatial area. The "Mod-

erate Zone" indicates a risk ratio that is 57-708 times the risk of the "Low Zone", while the "Severe Zone" indicates a risk ratio that is 2,503-38,647 times the risk of the "Low Zone".

2.5.4.4.2. The model uses the best available data for historical modeling of bird migratory patterns to provide the user with an effective decision making tool. Because birds are dynamic creatures whose migratory behavior is initiated by weather events in any given year, the model cannot be said to predict the exact movement of bird species through space and time beyond the biweekly timeframe. Spatial zones indicating a severe risk according to the model should not be ignored and should be avoided. It is not suggested that pilots fly within the "Severe Zone" unless it is absolutely mission essential.

2.5.4.4.3. The BAM is internet accessible at **http://usahas.com/bam/**. A link to the BAM is on the AFSC BASH website.

2.5.4.5. **AVIAN HAZARD ADVISORY SYSTEM (AHAS).** Like the Bird Avoidance Model (BAM), AHAS provides information on bird activity through the flight route. The distinction between the two is that on the planned flight route or MOA, BAM uses historical data to provide a depiction of what one might expect, whereas AHAS uses the BAM as a foundation and NEXRAD weather radar to provide a near real-time description of bird activity.

2.5.4.5.1. AHAS functions on the principle of assessing bird strike risk. Bird strike risk is the likelihood of a catastrophic event. This is a function of the mass of a bird: the larger the bird, the higher the risk of a catastrophic event. AHAS provides pilots and commanders with a standardized measurement of bird strike risk. This risk is rated as Low, Moderate, and Severe. The risk management decisions that are made for each category of bird strike risk depend on the type of aircraft you are flying. T-38s are much more vulnerable to serious damage from small birds than C-130s, for example. In a moderate condition, therefore, you would not expect to impose as significant risk management measures on C-130s as would be placed on T-38s. For this reason, AHAS does not make recommendations on the restrictions that should be imposed for any category of bird strike risk. These decisions should be made at the local level based on the airframe, the nature of the mission and the mission priority.

2.5.4.5.2. AHAS continuously monitors the current bird strike risk using the network of NEXRAD weather radars to look for bird activity on low-level routes, ranges, MOAs, or in the vicinity of military airfields. When bird activity is detected, in an area where the existing records indicate hazardous bird activity should be expected, a warning is generated. Predictive models are used for monitoring soaring bird activity that is not visible to NEXRAD. AHAS forecasts the bird strike risk for the next 24 hours using the weather observations and forecasting models of the National Weather Service. These forecast models predict the bird activity expected on low-level routes, ranges, MOAs, or in the vicinity of military airfields.

2.5.4.5.3. AHAS is internet accessible at **http://www.ahas.com**. Also, a link to AHAS is on the AFSC BASH website.

2.5.4.6. **Phase I and Phase II.** BHWG's should establish Phase I and Phase II periods in addition to the normal BWC codes. As discussed earlier, the BWC codes are the current condition on the airfield. As described in AFI 91-202, the Phase I/II determination alerts aircrews to expected hazards when traveling to an airfield or through a particular area. Phase I and II determinations are largely based on bird migration but may also be based on seasonal agricultural practices in the local area. During migration, when bird activity is heavy, the period should be determined to be

Phase II. After the migration has passed through, the airfield may return to Phase I. However, if migrating birds remain in the local area throughout the winter, Phase II should remain in effect until the birds leave during the spring migration. Northern tier bases may find themselves in Phase II during the summer breeding season and in Phase I during the winter when most of the birds move south. The BAM may be helpful in determining Phase I/II at a particular CONUS location. Phase II declarations may warrant increased bird dispersal activities, more frequent airfield checks, and/or changes to flight operations. The base BASH plan should detail any required changes to BASH responsibilities or flight operations during Phase II.

2.5.4.7. **Aircrew Preparations** :

2.5.4.7.1. Wildlife hazards should be considered and incorporated into the mission planning process IAW AFI 11-202, Vol 3. This would include applicable bird advisories and hazard information, available through Internet sources, Automated Terminal Information System (ATIS), or as disseminated locally.

2.5.4.7.2. Briefings on bird strikes and other wildlife hazards are much like briefings on take-off emergencies when urgency dictates a pre-planned course of action. As a minimum, aircrew briefings should include the following: Potential bird hazards along their proposed route of flight; use of the double helmet visors or sunglasses during daylight hours, the clear visor at night or during low-level operations; avoidance maneuvers at low altitude; actions if flocks of birds are encountered (for example, initiate a climb since the majority of birds dive to avoid a potential collision; and mission abort due to bird/wildlife strike

2.5.4.7.3. The aircrew's ability to react to a bird strike situation is further enhanced by periodically reviewing bird strike procedures during continuation training and safety briefings.

2.5.4.8. **Informing Transient Aircrews of Local Bird Hazards.** Transient aircrews are often unfamiliar with airfield hazards, including birds. At some bases, the most damaging bird strike incidents happen to transient aircraft. Information in the Flight Information Publications (FLiP) (IFR-Enroute Supplement, VFR-Enroute Supplement, and Area Planning/1B), and broadcasts of information on either Automatic Terminal Information Service (ATIS) or on initial radio contact can alert the aircrew of potential bird hazards. Advisory reports can inform aircrews of the timing and location of transient birds. AFI 91-202 requires publishing Phase I/II periods in FLiP.

2.5.4.9. **Aircrew Responsibility.** Aircrews are essential to detecting bird hazards on the airfield and in the local flying area. When aircrews sight birds, they should notify other aircrews and the controlling agency. Aircrews may also help Air Traffic Control (ATC) personnel remain aware of bird hazards by requesting bird hazard information before takeoff and landing. These requests remind air traffic controllers to be alert for birds when authorizing aircraft movements.

2.5.4.10. **Bird Hazard Identification.** Bird populations, both in the local area and in regions where low-level sorties are flown, should be monitored. Aircrews should be made aware of the potential bird hazards they face. In addition to the USAF BAM and AHAS, information on bird concentrations and movements can be obtained from local universities, state and federal wildlife agencies, and private organizations such as the National Audubon Society.

2.6. Technical Assistance. Up to date information on wildlife control and hazard reduction methods is available from several sources.

2.6.1. **USAF BASH Team**. The BASH Team assists in bird hazard reduction Air Force-wide. BASH Team personnel are trained in bird control and have experience in wildlife ecology, land management, and flight operations. They also have current information on authorized control equipment and techniques. A great deal of BASH information can be found on the USAF BASH website: **http://safety.kirtland.af.mil/AFSC/Bash/home.html**

2.6.2. **Air Force Civil Engineer Support Agency (AFCESA).** The BASH Team works closely with AFCESA personnel both to control pest birds in structures and for vegetation control requiring agronomy or entomology expertise.

2.6.3. **Federal and State Agencies.** Often, bases employ professional wildlife biologists, foresters, or agronomists who have valuable insights into base problems. Local expertise and assistance is available through the USDA Wildlife Services, U.S. Fish and Wildlife Service, or state natural resources department. **Attachment 4** contains a listing of agencies that can assist your BASH efforts.

2.6.4. **Private consultants.** In addition to Federal and state wildlife specialists, private consultants are available, via contract, to assist bases in resolving wildlife hazards. Private wildlife consultants possessing the proper wildlife hazard management background would be acceptable to provide assistance with the base BASH effort.

2.6.5. **Literature.** The following literature provides useful information on wildlife control methods and hazard reduction. For information on how to obtain copies, please contact the USAF BASH Team.

2.6.5.1. *Prevention and Control of Wildlife Damage*. Editors: Scott Hygnstrom, Robert Timm, Gary Larson. University of Nebraska Cooperative Extension - US Department of Agriculture - Animal Plant Health Inspection Services - Animal Damage Control.

2.6.5.2. *Wildlife Control Procedures Manual*. Bruce MacKinnon. Transport Canada, Airports Group. Safety and Technical Services. TP11500E.

2.6.5.3. *Wildlife Hazard Management at Airports: A Manual for Airport Personnel*. Prepared by Ed Cleary of the Federal Aviation Administration and Richard Dolbeer of the US Department of Agriculture.

2.6.5.4. Numerous wildlife guides and handbooks are available to aid with wildlife identifications for base surveys, wildlife behavior, and migratory habits. These may be obtained from the local base library or bookstores.

Chapter 3

AIRFIELD WILDLIFE HAZARDS

3.1. Overview of Airfield Wildlife Hazards. Although it would be impossible to site an example of all potential wildlife hazards found on airfields, the following are brief descriptions of general types of wildlife found on or around airfields and effective management techniques that may be used. It is very important to know which species is present before management techniques are applied. An appropriate field guide should be used to aid in identification. Additional information on management techniques may be found on the AFSC/SEFW website.

NOTE: **Application of the management techniques suggested below may require coordination with state and Federal authorities and compliance with AFI 32-7061, *Environmental Impact Analysis Process (EIAP)*, as promulgated by 32 Code of Federal Regulations (CFR) 989, 1999 (Amended, March 2001), the Air Force's supplement to the CEQ NEPA implementing regulations. For instance, filling in a swamp or wetland may require a state or Federal Clean Water Act section 404 permit. Similarly, action affecting flood plains or wetlands will require a Finding of No Practical Alternative (FONPA) in compliance with Executive Orders (EO) 11990 and 11988 (see AFIs 32-7061 and 32-7064). The direct or indirect taking of protected birds may require state or Federal permits or may not be permitted under any circumstances. Moreover, actions resulting in the destruction of protected wildlife habitat, or even certain harassment techniques, may similarly be absolutely prohibited. In all cases, if an endangered species or a protected species may be present, base authorities should consult with the USFWS and obtain any necessary permits before taking any actions to control wildlife hazards. Consult the base environmental flight to ensure compliance with state and Federal statutes and regulations.**

3.2. Loons, Grebes, Pelicans, Cormorants, Mergansers. These are fish-eating birds. Control is best accomplished by removing fish-producing ponds near the airfield. Since removal of the food source is not always possible, pyrotechnics are effective in frightening birds from the area. A gridwire system on a pond may also be effective in discouraging these birds. Avoid flying at sunrise and sunset when large flocks, often in formation, can be found flying to and from feeding areas.

3.3. Pelagic Birds (Albatross, Petrels, Shearwaters, Auks, etc.). Control of these birds is nearly impossible since natural predators are rare and the birds exhibit little fear of man or aircraft. Avoid flying near nesting areas during the brief summer nesting period. These huge nesting colonies are located on steep, rocky coastlines or on islands where many thousands of birds may concentrate.

3.4. Long-Legged Waders (Herons, Egrets, Ibises, Storks). Most of these species are attracted to water where they feed on fish, amphibians, reptiles, and arthropods. Control is best accomplished by eliminating the food sources. Steepening the sides of ditches and ponds and removing emergent vegetation will drastically reduce accessibility to food sources. Use pyrotechnics to disperse any birds occurring after habitat modification.

3.5. Cattle Egrets. These birds have different feeding habits than their relatives, preferring open fields where they primarily feed on insects. Cattle Egrets will commonly follow mowers for the invertebrates and other small animals stirred up or maimed and left behind by the mowing operation. When Cattle Egrets are present, mow during non-flying hours. Maintain grass between 7 to 14 inches. Periodic pesti-

cide application may be necessary for insect control. Eliminate roost sites on or near base by removing or thinning roost trees and brush and dispersing the birds each evening with pyrotechnics.

3.6. Waterfowl (Ducks, Geese, Swans). A distinction must be made between resident and migrating populations.

3.6.1. **Resident waterfowl** are attracted to an area to breed or feed. Ponds, lakes, ditches, etc., may attract these birds, particularly if these areas contain emergent or submerged vegetation for feeding, nesting, or shelter. Steepening ditch and pond banks and removing vegetation will reduce waterfowl numbers. When possible, drain water sources after ensuring compliance with wetlands laws and regulations. Wetland areas should be relocated as far from the runways and traffic patterns as possible. Grain fields may also attract waterfowl in large numbers and should be eliminated. Pyrotechnics along with gas cannons are somewhat effective control techniques for waterfowl. Use of live ammunition or opening base areas to waterfowl hunting are excellent methods of control. Resident waterfowl act as live decoys for migrating waterfowl and should not be allowed to linger on or near the airfield. Resident birds are most active at dawn and dusk, moving at low altitudes to and from feeding areas. Avoid flying near wildlife refuges or any ponds, lakes, or rivers with known waterfowl concentrations during these periods of the day.

3.6.2. **Migrating waterfowl** are particularly dangerous to aviation due to the large numbers and generally higher altitude of the birds. Large flocks of waterfowl travel along traditional flyways to their breeding and wintering grounds during spring and fall, respectively. Huge flocks may stop along the route awaiting favorable weather conditions to continue. Migrating birds are most active from sunset through midnight, with numbers decreasing in the early morning hours. October and November are most hazardous. Avoid flying during the evening hours if possible. Reference the online BAM and AHAS for bird hazard information associated with waterfowl migration and low-level routes. Wintering concentration areas should be avoided.

3.7. Raptors (Hawks, Falcons, Kites, Eagles, Vultures). These birds can be particularly hazardous to aircraft because of their size and widespread distribution. Raptors (particularly vultures) use thermals to their advantage in search of prey. These birds become active during mid-morning and remain aloft until late afternoon. Avoid areas with thermal generating terrain such as ridgelines, rolling hills, and near large bodies of water. Landfills are particularly attractive to soaring vultures. In the fall, raptors migrate by day to areas of heavy winter concentrations in the southern states and through Central America. Removing dead animals on the airfield, proper management of landfills, rodent control on airfields, and removal of dead trees and restricting access to other perching sites on the airfield can control these birds. Use pyrotechnics to frighten raptors from the airfield. Radio controlled airplanes can be effective in dispersing raptors from an airfield.

3.8. Grouse, Quail, and Pheasants. These game birds are most effectively controlled through proper grass-height management. Do not allow grass to exceed 14 inches and eliminate all brush, weed patches, and areas of bare ground on the field. Pyrotechnics, gas cannons, live ammunition or periodic hunts can effectively disperse these birds. The killing of these birds outside the normal hunting season requires depredation permits from the US Fish and Wildlife Service and state wildlife agencies.

3.9. Cranes. These large birds are most hazardous during migration, particularly in the fall when many thousands of birds may be concentrated in a small area. Avoid flying at dawn and dusk in areas of known concentrations. Use pyrotechnics on the airfield to disperse these birds.

3.10. Sandpipers and Shorebirds. The most significant hazard from these birds occurs when large numbers, flocking in tight groups, are present, particularly during migration and along coastlines. Many of the upland species such as Upland Sandpipers and Buff-Breasted Sandpipers may nest on airfields in spring and early summer. Other species such a Killdeer are quite adept at avoiding aircraft and do not pose a significant hazard. Flocks in coastal areas can be hazardous and should be avoided. To control these birds, observe proper grass height management, eliminate water in puddles, and steepen ditch banks to limit access to the water. Use pyrotechnics for all species. Some of these birds respond well to bioacoustics.

3.11. Gulls. When including both commercial and military bird strikes, gulls represent the most significant hazard to aircraft worldwide. Due to their omnivorous feeding habits and preference for flat, open areas to rest, they are commonly found on airfields. Gulls are most active just after sunrise and before sunset as they move to and from feeding areas. Improperly operated landfills are a significant source of attraction for gulls and should not be allowed in the airfield vicinity. Maintain grass height between 7 and 14 inches. This is critical in reducing gull numbers. Even with this in effect, gulls may inhabit the airfield, particularly during inclement weather. Persistent harassment using pyrotechnics and bioacoustics is necessary to discourage these birds. Gulls respond very well to falconry as a control technique. Occasionally, use live ammunition to reinforce these techniques (permits required). Control of earthworms and insects (especially grasshoppers) may need to be accomplished if these invertebrates are attracting gulls to the airfield. Do not allow these birds to establish a habit of using the airfield to feed, breed, or rest.

3.12. Terns. These are fish eating, gull-like birds common in coastal areas and on some major river systems and lakes. Avoid flying near areas where these birds may be active, such as nesting colonies or piers in coastal areas. Remove the food source or eliminate the fish-containing ponds if these birds pose a significant hazard.

3.13. Pigeons and Doves. These birds are seedeaters and are attracted to seed-producing weeds, grasses, and shrubs. Open areas or bare spots are attractive as resting or feeding sites. Pyrotechnics can be effective in frightening these birds. Proper turf management can limit the number of pigeons and doves on the field. A falconry program may effectively control pigeons and dove on the airfield. Pigeons frequently occur in structures such as hangars. Netting, shooting, trapping, use of falcons or hawks, and poison baiting can drastically reduce their numbers in these structures.

3.14. Owls. Most owls are nocturnal and attracted to rodents as a food source. Remove perch sites such as unnecessary fence posts and dead trees or use exclusion devices on airfield structures to limit the number of owls. Rodent control may be necessary if owls or other raptors are the most significant bird hazard at an airfield. However, managing airfield grass for rodent control can cause new bird hazards to develop, such as blackbirds, starlings, and gulls. Owls hunting inside hangars at night can drastically reduce pigeon populations. Burrowing Owls are common airfield residents in the western US. These owls occupy existing ground squirrel and prairie dog burrows. Burrowing owls are most active in the early morning and late evening hours, hunting insects, reptiles, and small rodents. They should not be allowed to establish residency on the airfield.

3.15. Goatsuckers (Nighthawks, Whip-poor-wills, etc.). These birds are active, particularly at sunset when insects are abundant. Little can be done to limit their numbers other than insect control. Avoid flying at times when these birds are abundant, particularly near lakes, streams, or other areas with large insect populations. Turning off all but necessary ramp lighting will reduce insect attraction after dark and reduce this important food source for these species.

3.16. Woodpeckers. Woodpecker strikes should be extremely rare. These birds are common in forested areas, but generally remain below canopy level. On the airfield, elimination of trees should eliminate strikes with these birds. Migratory birds may be encountered, but are rarely struck.

3.17. Flycatchers. These birds are present on airfields, feeding on insects. Strikes are infrequent, but should not be overlooked. Controlling insects and removing perch sites such as fence posts, tree limbs, bushes, high spots on the airfield, etc., best accomplishes control.

3.18. Horned Larks. These birds are very difficult to control. They are attracted to bare spots, such as those along runway edges, to eat weed seeds and insects. The best defense against these birds is thick, uniform grass with no bare spots. In the southwest, this may not be possible, as grass cannot be maintained without intense irrigation. Consider coating bare spots, particularly along runways, with oil-base or asphalt cover. Use pyrotechnics, but these birds will tend to fly only short distances and settle down. Persistence with this specie is the key to success.

3.19. Swallows and Pratincoles. These birds eat insects in flight and are commonly found above airfields. Fortunately, swallows are adept at avoiding aircraft, but if they do present a problem, measures can be taken for their dispersal. Insect control will reduce swallow numbers and discouragement of nesting will further decrease numbers. Wash mud nests from eaves, culverts, etc., with a hose as the birds begin to build, but prior to eggs being laid. Harassing the birds as they work on building nests can discourage nesting in banks. If swallows are noted resting on runways or taxiways, use pyrotechnics to disperse them. Fogging methylanthranilate is occasionally successful in dispersing swallows from an airfield but the birds will often return the next day so persistence is the key to success.

3.20. Crows and Ravens. These omnivorous birds are common in open areas and around landfills. These birds may occur in large flocks, particularly at sunset as they return to roost sites. Proper grass-height management will reduce population numbers. Remove any known roost sites or thin individual trees. Operate landfills in a manner to discourage these birds. Use bioacoustics and pyrotechnics to frighten these birds if they occur on the field.

3.21. Blackbirds, Grackles, Cowbirds, and Starlings. These birds can be particularly hazardous because they frequently occur in huge flocks, sometimes in the millions. Blackbirds and starlings are attracted to flat, open areas to feed, rest, or stage/pre-roost. Maintain grass height between 7 and 14 inches to best reduce airfield blackbird and starling numbers. Do not allow seed-producing weeds to grow on the airfield nor outlease grain crops in areas where these birds are known to occur. Eliminate roost sites near the flight line. Selectively prune or remove roost trees, brush, or cattails if blackbirds and starlings are roosting on base. Blackbirds and starlings respond well to an intense frightening program using bioacoustics and pyrotechnics. Use other methods to supplement this program as necessary. Starlings are not federally protected and may be killed without permits. Permits are required for other species. Occasional shooting of birds will reinforce other frightening techniques. Consider poisoning or trapping, with US

Fish and Wildlife Service or USDA/ Wildlife Services assistance. Avoid at all costs flying near known blackbird and starling roosts, especially at sunrise and sunset and during spring and fall migration. Huge roosting colonies may also be present during winter months in southern states.

3.22. Meadowlarks. These birds occur on nearly every airfield and are attracted to grasslands and low weeds. Eliminate broad-leaf weeds and maintain grass height at 7 to 14 inches. Elimination of suitable perching sites, such as fence posts and brush, will also aid in reduction. Use pyrotechnics, but remember meadowlarks usually fly only a short distance before settling down again. Persistence is the key to success.

3.23. House Sparrows. Aircraft do not frequently strike these birds, but they are common pests around structures. House Sparrows often nest in hangars and dense shrubs and trees. These birds are not protected by law and may be killed without permits. Frightening techniques are usually ineffective against these birds.

3.24. Warblers. The wide range of species of warblers thrives in a variety of habitats. Most prefer shrubs, trees, or riparian habitats where they feed, breed, or rest. Do not allow these habitat types on the airfield and warbler strikes will be rare as a result. Migrating warblers may be struck at night, especially as they fly south in the fall. Fortunately, these birds are very small and rarely cause damage.

3.25. Fringillids (Sparrows, Finches, Grosbeaks, and Buntings). Most Fringillids are not hazardous to aircraft operations, but occasional large flocks can be encountered, particularly during migration. These birds are seedeaters as a rule, and most prefer weedy, brushy, or forested areas. Proper grass height management is the best means of control. Grass exceeding 14 inches will attract many of these birds and should not be allowed. Use pyrotechnics to frighten many of these birds; success may be limited with others.

3.26. Other Wildlife. While concern is mostly centered on birds, several mammalian species also pose a threat to flight operations and must be considered. Close coordination with the Integrated Natural Resources Management Plan is necessary to reduce this type of hazard.

3.26.1. **Deer.** Members of the deer family (including moose, elk and caribou) occasionally occur on airfields. These species are generally browsers, preferring broad-leaf weeds, shrubs, and trees. Do not allow growth of these plants on the airfield. The presence of these plants in surrounding areas will serve to draw these animals from the airfield. Tall fences (reference section **2.3.9.** of this document) can discourage these animals from entering airfields. Fencing should be secured to the ground as deer will often push under a fence with little more than an 8 – 10 inch opening. Long term maintenance and management costs of electric fences may offset any short term cost savings. On-base hunting will also discourage the presence of deer species. Use pyrotechnics to frighten these animals when they do occur on the airfield.

NOTE: During hunting season, local hunting pressure may cause an increase in the on-base population as deer seek refuge.

3.26.2. **Coyotes and Foxes.** These animals are attracted to airfields by rodents, rabbits, and other food sources. Dens may be found in banks, culverts, or other suitable areas. Chain link fencing used for deer control will also be effective in excluding coyotes from entering the airfield. Rodent control may reduce the numbers of these animals. Use pyrotechnics to frighten these species. Occasional

shooting of individual animals or recurrent pests will also reduce the hazard. Coordinate with base natural resources personnel on permit requirements.

3.26.3. **Rabbits and Hares.** In addition to direct hazards to aircraft, these animals often attract raptors. Proper grass management will reduce the numbers of these animals on airfields. Occasional extensive rabbit hunts on the field can reduce populations for several subsequent years. Trapping or poisoning can also be effective for reduction of populations. Permits may be required.

3.26.4. **Rodents.** These animals attract raptors, coyotes, and foxes. The base civil engineer pest manager or USDA Wildlife Services may use rodenticides in some cases.

3.26.5. **Bats.** Similar to birds only in that they are capable of flight, these winged mammals may pose a threat to aircraft operations, particularly at dusk. In addition, they may carry diseases such as rabies. Although generally beneficial, bats may pose hazards if roosts develop in specific locations. Base environmental initiatives to support bat colonies should consider flying activity as well as base housing prior to establishing habitat for bats.

3.27. Form Adopted. AF 853, **Air Force Bird Strike Report.**

KENNETH W. HESS, Major General, USAF
Chief of Safety

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 11-202 Vol 3, *General Flight Rules*

AFI 21-201, *Management and Maintenance of Non-Nuclear Munitions*

AFI 32-1053, *Pest Management Program*

AFI 32-7061, *Environmental Impact Analysis Process*

AFI 32-7064, *Integrated Natural Resources Management*

AFI 64-117, *Air Force Government-wide Purchase Card Program*

AFPD 91-2, *Safety Programs*

AFMAN 91-201, *Explosives Safety Standards*

AFI 91-202, *The US Air Force Mishap Prevention Program*

AFI 91-204, *Safety Investigations and Reports*

AFI 91-207, *The US Air Force Traffic Safety Program*

50 CFR 21.41, *Migratory Bird Depredation Permits*

51 FR 41206, *Final Rule for Regulatory Programs of the Corps of Engineers*

Abbreviations and Acronyms

AFCESA—Air Force Civil Engineering Support Agency

AFSAS—Air Force Safety Automated System

AGL—Above ground level

AHAS —Avian hazard advisory system

ATC—Air traffic control

ATIS—Automatic Terminal Information Service

ATV—All-Terrain Vehicle

BASH—Bird/wildlife Aircraft Strike Hazard

BBS—Breeding bird survey

BHWG—Bird Hazard Working Group

BWC—Bird watch condition

CBC—Christmas Bird Count

CE—Civil Engineering

COTS—Commercial-off-the-shelf

EM—Environmental Management

FliP—Flight information publications

GIS—Geographic information system

MOA—Military operating area

NEXRAD—Next generation weather radar

OPR—Office of Primary Responsibility

PVC—Poly-vinyl Chloride

VMC—Visual meteorological conditions

USDA—United States Department of Agriculture

USFWS—United States Fish and Wildlife Service

Terms

Aircraft Design—Engineering improvements that reduce aircraft damage when a bird strike occurs (for example, improved windscreen design).

Bird Avoidance—Techniques (including radar detection, warning, and use of bird data) that reduce potential for bird strikes by allowing aircrews to schedule or maneuver to avoid bird concentrations.

Bird Control—Any biological, chemical, or physical procedure that discourages the presence of birds. These procedures include repellents, toxicants, harassment, grounds maintenance, and habitat modification.

Bird Data—Information about the ecology, anatomy, physiology, behavior, size, movement, and distribution of birds that may be helpful in bird control, bird avoidance, and aircraft design.

Bird Hazard Reduction Plan—A written document that addresses bird strike hazards and designates organizations responsible for implementing solutions.

Bird Hazard Warning System—A set of procedures, using standard bird watch condition codes, for immediate exchange of information between ground and airborne personnel concerning the existence and location of birds posing a hazard to flight.

Bird Species—A group of interbreeding birds with common characteristics such as size, shape, voice, and behavior.

Bird/Wildlife Strike—Any collision between a bird or other specie of wildlife and an aircraft.

Bird Watch Condition Codes—The following terminology is established for rapid communication of bird activity. When communicating, avoid color-coded conditions to eliminate any confusion with color codes used during exercises, contingencies, and emergencies (i.e., disaster preparedness exercises). Also, give bird locations with the condition code:

- Bird Watch Condition SEVERE. Bird activity on or immediately above the active runway or other specific location representing high potential for strikes. Supervisors and aircrews must thoroughly evaluate mission need before conducting operations in areas under condition SEVERE.

- Bird Watch Condition MODERATE. Bird activity near the active runway or other specific location representing increased potential for strikes. BWC moderate requires increased vigilance by all agencies and supervisors, and caution by aircrews.

- Bird Watch Condition LOW. Bird activity on and around the airfield representing low potential for strikes.

Damaging Bird/Wildlife Strike—Any bird/wildlife strike that causes reportable damage according to AFI 91-204, *Safety Investigations and Reports*.

Habitat—The total environmental elements of food, water, shelter, nesting sites, and space that must be present for wildlife species to survive.

Non-damaging Bird/Wildlife Strike—Any bird/wildlife strike that does not cause reportable damage to the aircraft IAW AFI 91-204, *Safety Investigations and Reports*.

Migratory Bird Treaty Act, 16 U.S.C. 703—Federal statute which makes it a felony to kill, take or possess migratory birds without a permit.

Endangered Species Act, 16 U.S.C. 1531—Federal environmental statute that makes it a felony to "take" an endangered species. As used in the Act, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect an endangered species. Criminal liability under the Act can be imposed for indirect takings resulting from the destruction of an endangered species habitat.

Bald and Golden Eagle Protection Act, 16 U.S.C. 668. —Federal criminal statute which makes it a misdemeanor to kill, take or possess Bald and Golden Eagles.

Attachment 2

BASH SELF-INSPECTION CHECKLIST

A2.1. The following are suggestions for building effective BASH self-inspection checklists.

A2.1.1. Are all BASH related regulations current and readily available?

A2.1.2. Has a BASH reduction program been implemented?

A2.1.3. Has a BASH plan been written?

A2.1.4. Is the BASH plan reviewed annually?

A2.1.5. Are changes and annual reviews posted to the plan?

A2.1.6. Does the program establish a Bird Hazard Working Group (BHWG)?

A2.1.7. Are base agencies such as Safety, CE or EM (Environmental Management) and Ops assigned responsibilities for the BASH program?

A2.1.8. Is the wing vice commander (or equivalent) the BHWG chairman?

A2.1.9. Is there an assigned OPR of the BHWG?

A2.1.10. Does the BHWG meet at least semiannually, are minutes being recorded and filed?

A2.1.11. Are BASH topics included in flight safety briefings?

A2.1.12. Are BASH related materials posted in aircrew briefing areas, on safety bulletin boards or base operations flight planning areas?

A2.1.13. Are local bird problems documented?

A2.1.14. Are both damaging and non-damaging bird strikes recorded?

A2.1.15. Are all damaging and non-damaging bird strikes reported IAW AFI 91-204?

A2.1.16. Are all bird strike remains being collected and sent to the Smithsonian Institution IAW 91-204?

A2.1.17. Is the bird strike information tracked to facilitate the identification of trends?

A2.1.18. Is a bird identification book readily available?

A2.1.19. Are daily surveys taken of the airfield and surrounding area to observe potential and actual bird hazards?

A2.1.20. Are records of daily observations kept in order to establish trends?

A2.1.21. During the surveys, are areas of standing water, food sources or areas birds use for protection noted?

A2.1.22. Is the vegetation on the airfield particularly attractive to birds?

A2.1.23. Does the mowing or guideline contract specify the grass be maintained at a height of 7-14 inches?

A2.1.24. Does the base practice controlled burning?

A2.1.25. Are birds attracted to the taxiways or runways?

A2.1.26. Have the birds utilizing taxiways and runways been identified?

A2.1.27. Are birds attracted to areas of water on the airfield?

A2.1.28. Are the birds feeding in these wet areas?

A2.1.29. Are the birds attracted to these wet areas identified?

A2.1.30. Do the wet areas contain vegetation along their perimeters?

A2.1.31. Do the wet areas contain fish and/or amphibians?

A2.1.32. Are the wet areas permanent?

A2.1.33. Are there other areas near the runways that attract birds (horse stables, recreation areas, golf courses, etc.)?

A2.1.34. Can it be determined what is attracting the birds?

A2.1.35. Have the birds been identified?

A2.1.36. Do agricultural practices around the area attract birds?

A2.1.37. Is the base notified of the plowing times in order to alter operations?

A2.1.38. Does the base outlease cropland on adjacent areas?

A2.1.39. Does the lease provide for restrictions concerning BASH?

A2.1.40. Are landfills or sewage lagoons located near the base?

A2.1.41. Are these sites covered daily with dirt, wire or netting to discourage birds?

A2.1.42. Do these sites attract birds?

A2.1.43. Are other areas near the base attractive to birds (i.e. lakes, ponds, swamps, cemeteries or wildlife areas)?

A2.1.44. Are game birds and deer controlled so as not to interfere with flying operations?

A2.1.45. Does the control tower warn operations and pilots of birds in the airdrome?

A2.1.46. Is there a designated bird dispersal team?

A2.1.47. What is the average time between upgrade to Bird Watch Condition SEVERE and downgrade back to MODERATE?

A2.1.48. Is bird harassment equipment on hand and readily available?

A2.1.49. Are members of the bird dispersal team trained on dispersal techniques?

A2.1.50. Is a depredation permit on hand and current?

A2.1.51. Are the BAM and/or AHAS being used during flight scheduling and mission planning?

Attachment 3

LOW-LEVEL FLIGHT BASH CONSIDERATIONS

A3.1. Flying routes under the following conditions should be avoided:

A3.1.1. Areas with known raptor (birds of prey) concentrations during summer, especially during 1000-1700 hours, due to increased thermals. Generally, a maximum altitude of 3,000-4,000' AGL is reached by all raptor species, though soaring can occur at considerably higher altitudes.

A3.1.2. Areas with ideal terrain for creating thermals during summer months, such as ridgelines, rolling hills and areas near large bodies of water. This applies to southern Florida and Texas during winter.

A3.2. Should avoid flying one hour before and after sunrise/sunset when there is a known increase in bird activity to reduce potential hazards, or when in the following areas: All coastal areas, Great Lakes region, and Great Salt Lake to avoid gulls and shorebirds; areas of known blackbird and starling roosts. Information is available from the USFWS and local experts; and Known local concentrations of waterfowl (ducks, geese, pelicans and swans).

A3.3. Potential bird strike hazards increase at altitudes with most favorable wind speed and direction for migrating birds (particularly near shear altitudes) up to 48 hours prior to and 24 hours after frontal passage; especially during October and November. Weather is a prime stimulus for migratory bird movements.

A3.4. Flying near wildlife refuges, landfills, stockyards, and food processing plants should be avoided, as these all attract birds.

A3.5. The following should be obtained from the Internet to best assess low-level and special use airspace bird hazards: Bird Avoidance Model (BAM) bird hazard risk predictions. The BAM may be accessed at **www.usahas.com** or through the USAF BASH web page (safety.Kirtland.af.mil/AFSC/Bash/home.html); and Avian Hazard Advisory System (AHAS) near real time bird risk predictions. AHAS can be accessed at **www.usahas.com** or through a link from the USAF BASH web page (safety.Kirtland.af.mil/AFSC/Bash/home.html).

A3.6. The following may be obtained from HQ AFSC/SEFW, Kirtland AFB to best assess low-level route hazards: Specific guidance when unusual bird movements are noted and guidance in specific geographical areas.

A3.7. Consider the following operational changes to reduce threats from bird strikes, mission requirements permitting: Reduce low-level flight time; reduce formation flying; reduce airspeed at low-levels; and increase altitudes during low-level flights.

Attachment 4

US DEPARTMENT OF AGRICULTURE ANIMAL WILDLIFE SERVICES AND US FISH AND WILDLIFE SERVICE OFFICES

A4.1. Contact the regional offices, listed below, to locate the nearest USDA Wildlife Services specialist or US Fish and Wildlife Service Law Enforcement Officer for assistance with nuisance wildlife or depredation permits.

A4.2. States included in the USDA Regional Offices are generally divided by the Mississippi River.

USDA Wildlife Services
Eastern Regional Office
920 Main Campus Dr, Ste
200 Raleigh, NC 27606
Phone # (919) 716-5636

USDA Wildlife Services
Western Regional Office
12345 W. Alameda Pkwy
Suite 204 Lakewood, CO 80228
Phone # (303) 969-6560

US Fish and Wildlife Service Regional Office locations, telephone number, and the states included in each district:

Region 1, Portland, Oregon; phone # (503) 872-2715; CA, HI, ID, NV, OR, WA, Pacific Island Territories

Region 2, Albuquerque, New Mexico; phone # (505) 248-7882; AZ, NM, OK, TX

Region 3, Ft. Snelling, Minnesota; phone # (612) 713-5436; IA, IL, IN, MI, MN, MO, OH, WI

Region 4, Atlanta, Georgia; phone # (404) 679-7070; AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, Puerto Rico, US Virgin Islands

Region 5, Hadley, Massachusetts; phone # (413) 253-8641; CT, DE, District of Columbia, MA, ME, MD, NH, NJ, NY, PA, RI, VA, VT, WV

Region 6, Denver, Colorado; phone # (303) 236-8171; CO, KS, MT, NE, ND, SD, UT, WY

Region 7, Anchorage, Alaska; phone # (907) 786-3693; AK

Attachment 5

AUTHORIZED BASH EQUIPMENT LIST

A5.1. Consult with your MAJCOM/SEF or HQ AFSC/ SEFW for up-to-date equipment authorization information due to frequent changes in wildlife control products.

NATIONAL STOCK NUMBER NOMENCLATURE PART NUMBER

NSN 665001108 Binoculars, prism type PN 6702513

NSN 5835010533152 Cassette Tape Recorder PN Model AP 30

NSN 5965010536210 Speaker, High Power PN Model AP 30

NSN 3740000763541 Gas Exploding Cannon BB 101

Pyrotechnics

Launchers

NSN 1095014377478 15mm single shot

NSN 1095014377479 15mm double shot

Cartridges

NOTE:

Do not use semi-automatic shotguns to launch scare cartridges because they will jam the action.

NSN 1370012041525 12 ga, Bird Scare (Shell Cracker)

- 12 ga, Bird Scare (Shot Tell) manufactured by Stoneco, Inc. and marketed by Reed-Joseph International is suitable substitute (AAC/SES ltr, 10 Dec 99)

NSN 1370014549861 15mm Screamer & 6mm blank (hazard classification HD 1.4G)

NSN 1370014552640 15mm Bird Banger (hazard classification HD 1.4G)

NSN 1305014562560 6mm blank (hazard classification HD 1.4S)

Munitions

Shotgun

NSN 1005009735645	12ga, pump, PN Model 870 (old NSN)
NSN 1005010658989	12ga, pump, PN Model 870 (new NSN)
NSN 1005009341404	12ga, automatic, PN Model 1100-12
NSN 1005010732368	12ga, single barrel, PN Model 162

Shot Shells – Stock Listed

NSN 1305012327415	12ga, #9 Lead
NSN 1305012328338	12ga, #00 Buckshot Lead
NSN 1305012328339	12ga, #7 ½ Lead, Federal

NSN 1305013865604 12ga, Slug

NSN 1305013865605 12ga, #7 ½ Lead, trap load

NSN 1305013862028 12ga, #9 Lead, trap load

Shot Shells – Approved by OO-ALC/LIWC for local purchase IAW 21-201

Federal – 12ga, 2 ¾ in, #2 Steel Shot

Olin/Winchester –12ga, Non-Toxic Loads

Super-X Drylok Super Steel Non-Toxic Waterfowl Loads

XSD122 2 ¾ in, #2

XSD124 2 ¾ in, #4

XSD126 2 ¾ in, #6

XS122 2 ¾ in, #2

XS124 2 ¾ in, #4

XS126 2 ¾ in, #6

Super-X Drylok Super Steel Non-Toxic Magnum Waterfowl Loads

XSM123BB 3 in, #BB

XSM1231 3 in, #1

XSM1232 3 in, #2

XSM1233 3 in, #3

XSM1234 3 in, #4

XSV123BB 3 in, #BB

XSV1231 3 in, #1

XSV1232 3 in, #2

XSV1233 3 in, #3

XSV1234 3 in, #4

XSM12BB 2 ¾ in, #BB

XSM121 2 ¾ in, #1

XSM122 2 ¾ in, #2

XSM123 2 ¾ in, #3

XSM124 2 ¾ in, #4

XSM126 2 ¾ in, #6

Super-X Drylok Super Steel Non-Toxic Copperplated Magnum Goose Loads

XSC123T 3 in, #T

XSC123BB	3 in, #BBB
XSC12T	2 ¾ in, #T
XSC12BBB	2 ¾ in, #BBB

Double A Steel Target Load

AAST127	2 ¾ in, #7

Olin/Winchester – 12ga

Supreme Double-X Magnum Game Loads – Copper-plated, Buffered Shot

X123XC4	3 inch	1 7/8 oz shot	#4
X123XC6	3 inch	1 7/8 oz	#6
X123MT4	3 inch	1 7/8 oz	#4
X123MT6	3 inch	1 7/8 oz	#6
X12MXC4	3 inch	1 5/8 oz	#4
X12MXC6	3 inch	1 5/8 oz	#6
X12XC4	2 ¾ in	1 ½ oz	#4
X12XC5	2 ¾ in	1 ½ oz	#5
X12XC6	2 ¾ in	1 ½ oz	#6
X12MT4	2 ¾ in	1 ½ oz	#4
X12MT6	2 ¾ in	1 ½ oz	#6

Supreme High Velocity Turkey Loads, Copper-plated, Buffered Shot

STH12354	3 ½ in	2 oz	#4
STH12355	3 ½ in	2 oz	#5
STH12356	3 ½ in	2 oz	#6
STH1234	3 inch	1 ¾ oz	#4
STH1235	3 inch	1 ¾ oz	#5
STH1236	3 inch	1 ¾ oz	#6

Supreme Double-X Magnum Turkey Loads, Copper-plated, Buffered Shot

XXT12L4	3 ½ in	2 ¼ oz	#4
XXT12L5	3 ½ in	2 ¼ oz	#5
XXT12L6	3 ½ in	2 ¼ oz	#6
X123MXCT4	3 inch	2 oz	#4
X123MXCT5	3 inch	2 oz	#5
X123MXCT6	3 inch	2 oz	#6
X12HXCT4	2 ¾ in	1 5/8 oz	#4
X12HXCT5	2 ¾ in	1 5/8 oz	#5
X12HXCT6	2 ¾ in	1 5/8 oz	#6

Super-X High Brass Game Loads

X124	2 ¾ in	1 ¼ oz	#4
X125	2 ¾ in	1 ¼ oz	#5
X126	2 ¾ in	1 ¼ oz	#6
X127	2 ¾ in	1 ¼ oz	#7 ½
X128	2 ¾ in	1 ¼ oz	#8

AA Target Loads – Super Pigeon

AA12SP6	2 ¾ in	1 ¼ oz	#6
AA12SP7	2 ¾ in	1 ¼ oz	#7 ½
AA12SP8	2 ¾ in	1 ¼ oz	#8

AA Target Loads – Super Handicap

AAH127	2 ¾ in	1 1/8 oz	#7 ½
AAH128	2 ¾ in	1 1/8 oz	#8

AA Target Loads – Heavy Target Load

AAM127	2 ¾ in	1 1/8 oz	#7 ½

AAM128	2 ¾ in	1 1/8 oz	#8
AAM129	2 ¾ in	1 1/8 oz	#9

AA Target Loads – Target Load

AA127	2 ¾ in	1 1/8 oz	#7 ½
AA128	2 ¾ in	1 1/8 oz	#8
AA129	2 ¾ in	1 1/8 oz	#9
AAHL127	2 ¾ in	1 oz	#7 ½
AAHL128	2 ¾ in	1 oz	#8

AA Target Loads – Xtra-Lite

AAL127	2 ¾ in	1 oz shot	#7 ½
AAL128	2 ¾ in	1 oz	#8
AAL129	2 ¾ in	1 oz	#9

Upland Game Loads

WU126	2 ¾ in	1 oz shot	#6
WU127	2 ¾ in	1 oz	#7 ½
WU128	2 ¾ in	1 oz	#8

Upland Heavy Game Loads

WU12H4	2 ¾ in	1 1/8 oz	#4
WU12H6	2 ¾ in	1 1/8 oz	#6
WU12H7	2 ¾ in	1 1/8 oz	#7 ½
WU12H8	2 ¾ in	1 1/8 oz	#8
WU12SP77	2 ¾ in	1 ¼ oz	#7 ½
WU12SP78	2 ¾ in	1 ¼ oz	#8

Upland Heavy Field Loads

WU12P4	2 ¾ in	1 ¼ oz	#4
WU12P6	2 ¾ in	1 ¼ oz	#6
WU12P7	2 ¾ in	1 ¼ oz	#7 ½

Attachment 6

BASH VIDEO LIST

A6.1. Please contact the Joint Visual Information Services Distribution Activity Customer Service Representative at the following numbers to order any of the listed videos.

Phone: (570) 895-6543
DSN: 795-6543
Fax: DSN 795-6106

1) BASH-Bird/Wildlife Aircraft Strike Hazard #609163

2) Dangerous Encounters - BASH #602702

3) BASH Low Level #609164

4) Frightening Techniques #604805

5) Legacies – There Is A Choice (Alaska AWACS video) #613359

Attachment 7

BASH DEPLOYMENT KIT

A7.1. This is a list of suggested items for a BASH deployment kit. Items and quantities may be adjusted to meet deployment needs.

QTY	Object
5	15 mm launchers
2	Model 870 12 Gauge Shotguns
2	Very Pistols with sleeves for Shell Crackers
500	Rounds Shell Crackers
1000	Rounds 15 mm Screamers with 6 mm blanks
1000	Rounds 15 mm Bangers with 6 mm blanks
1	Case 12 Gauge #6 Shot
2	Propane Cannons with Gas Bottles
2	Hand Held Distress Call Systems (Bull Horns)
1	Vehicle
2	Hand-Held Radios For Tower Communication
2	Pairs of Binoculars
2	Bird Identification Books for the Area
2	Hand-Held Spotlights with Car Adapter for Power
2	Shovels
2	Potato Rakes
1	Tractor and Mowing Machine (Bush Hog)
Several	Note Pads, Pencils, Pens, Plastic Bags, Water Spray Bottles, Paper Towels, old newspaper for wrapping bird strike remains for shipping.