Advisory Circular

AC139-16

Revision 1 (0)

Worldlife Hazard Management at Aerodromes

21 March 2023

General

Civil Aviation Authority (CAA) Advisory Circulars (ACs) contain information about standards, practices, and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

An AC may also include Guidance Material (GM) to facilitate compliance with the rule requirements. Guidance material must not be regarded as an acceptable means of compliance.

Purpose

This AC provides material to assist compliance with Civil Aviation Rule 139.71, Wildlife Hazard Management, particularly the control of bird hazards at aerodromes.

The AC also contains information related to the control of birds in the vicinity of aerodromes for the guidance of aerodrome operators and local territorial authorities.

The AC is not exhaustive in addressing how to control bird hazards. It presents a compilation of methods to assist aerodrome operators and local territorial authorities to establish or enhance a bird hazard management program, and may raise issues for their further consideration.

Related Rules

This AC relates specifically to Part 139.

Change Notice

ICAO 29th Assembly Resolution A29-3 of year 1992 urges States to promote global harmonization of national rules. In order to implement this Resolution, Mongolian Civil Aviation Regulation has been developed based on “Memorandum for Technical Cooperation” between CAA of Mongolia and New Zealand, signed on 06.May.1999.

Amendment 164 of Annex 1 to the Chicago Convention on International Civil Aviation urges pilots, navigators using radiotelephony, air traffic controllers and aeronautical station operators to comply with the language proficiency requirements; and

Under Article 14 of the Civil Aviation Act, “Use of foreign language in civil aviation” the AC has been released in English version only, in order to prevent any mistranslation and misuse of the aviation safety related documents.

This AC139-16 rev.1 was issued based on NZ AC139-16 rev.0, dated on 07.Oct.2011.

AC139-16 rev.1 makes editorial and formatting changes.

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Introduction

Birds and aircraft co-exist with extreme risk. A bird strike can cause significant damage to aircraft and lead to other dire consequences.

To mitigate the risk of bird incidents (i.e., strikes and near misses), certificated aerodrome operators are required by Part 139 to have a wildlife hazard management program. A significant component of any such program is a bird hazard management program to address the control of bird hazards at and near an aerodrome.

An effective program usually takes a holistic and integrated approach, incorporating a variety of measures (i.e., active and passive management techniques) to gain maximum benefit.

This AC discusses the key parts of a bird hazard management program. It has been written to help any aerodrome operator, whether certificated or not, to establish or enhance a bird hazard management program.

The management techniques described in the first part of this AC are a compilation of generic methodologies that do not necessarily target a specific problem species.

This AC also raises other issues aerodrome operators need to consider as part of their strategic planning process.

An effective bird hazard management program can significantly reduce the costs, risks and damages associated with bird strike.

Overview of a bird hazard management program

Justification

A bird strike can result in direct, indirect and ancillary costs.

Direct costs

The direct costs of a bird strike are directly proportional to the amount of damage incurred by the aircraft as a result of the strike.

Jet engines with their large air intakes are more vulnerable to damage than propeller-driven aircraft engines, which have a smaller air intake and are shielded by the propeller unit, which incurs most of the damage. However, engines are not the only expensive components of the aircraft structure that are likely to be damaged. The leading edge of the wings, the flaps, the lights, landing gear, windscreens, pitot tubes and the navigation aerials are also prone to damage.

Indirect costs

The indirect costs associated with a bird strike include the costs of:

- fuel used and dumped during precautionary and emergency landing procedures
- transporting replacement parts and mechanics to the site
- accommodating, compensating and providing meals for stranded passengers and flight crews
- relocating replacement aircraft with flight crew

- replacing damaged aircraft on subsequent scheduled flights until repairs have been made to the damaged aircraft
- the damaged aircraft's downtime
- delays, especially on highly integrated airline schedules and particularly for airlines employing major hub-and-spoke operations
- lost passenger confidence and goodwill.

Passengers also incur indirect costs, such as the costs associated with:

- missed connections
- re-booking alternate flights
- lost business opportunities as a result of delays.

Ancillary costs

Ancillary costs are incurred by the aerodrome owner or operator, regulatory authorities, other aerodrome users and the emergency-response agencies that deal with the results of bird strikes.

The ancillary costs associated with a bird strike include the costs of:

- runway closures
- the airport emergency response
- the off-airport emergency response by ambulance, fire and police services and hospital emergency-room staff
- runway clean-up and repairs
- flight arrival and departure delays
- the additional fuel used by aircraft during delays
- developing, implementing and maintaining aerodrome wildlife management programs
- investigations and safety reviews
- administration by the regulatory agencies involved with bird hazard management.

Holistic and integrated approach

An effective bird hazard management program is usually developed with input from a variety of sources, including all aviation interests (ie, from the aerodrome operator, air traffic control and aircraft operators to people and organisations that influence land use such as local authorities and other government agencies), as well as the Department of Conservation, biologists and ornithologists.

An effective program takes a holistic approach, starting with an assessment of all the bird species in the area to ensure that a reduction in one species or the creation of a habitat to deter one species will not be beneficial to another species.

Each aerodrome's different ecological structures and environmental conditions mean similar control techniques may have different consequences for the same target bird species. Therefore, a program should be independently devised for each aerodrome and its results monitored carefully.

Passive and active management techniques work together to ensure effective bird management. Active management techniques can be counterproductive if, for instance, passive measures have not reduced the availability of food, water and shelter at other parts of the aerodrome or its environs.

Longer term passive management techniques (i.e., modifying a bird's habitat by removing ponds or planting different ground cover) reduce the need for active management measures.

Birds develop habits quickly, so become accustomed to control techniques that are excessive or repetitive or visual deterrents that are stationary for extended periods. Therefore, it is important to conduct a range of activities to maintain the program's overall effectiveness.

Planning

Active management techniques should reduce an immediate bird hazard. However, it is vital to use a range of methods to ensure their continued effectiveness and immediate benefit.

A strategic, longer term approach also needs to be adopted. Passive management techniques generally take longer to implement and are more expensive in the short term, but have a more sustainable effect than active management techniques.

Passive techniques aim to modify habitats and reduce the attractants that cause birds to congregate in the aerodrome's environs. Some active management techniques can also be used to take effect over a longer period. For example, targeting a reduction in the number of juveniles by manipulating the egg-hatching of a particular problem species is one such approach. Over a few years the number of birds reaching adulthood and breeding status will be reduced.

Budgets

Budgetary planning is another important aspect of an effective bird hazard management program. Aerodrome operators should take account of active and passive management methodologies when preparing their annual budgets. These can be viewed as compliance costs (ie, protection against liability action that could occur as a result of a bird strike) or, quite simply, as protection of aeronautical revenues.

Expenditure may be seasonal or constant over the year, depending on the bird hazard management program.

Staff, the materials used to implement active management techniques and the use of contractors or sponsorship for habitat modification should all be taken into account.

Aerodrome operators should also consider their capital expenditure budgets when installing permanent features on physical infrastructure or purchasing equipment as a result of the bird hazard management program.

Staff

Few aerodrome operators can justify employing dedicated bird patrol staff, so consider using staff who are also used for other specialist duties.

Staff should be trained to identify bird species and carry out detailed surveillance, harassment and environmental management procedures. A bird hazard management checklist that can be applied to infrastructure design and construction and maintenance activities is also useful for staff.

Make sure employees, tenants, concessionaires and contractors at the aerodrome are aware (through a campaign or as part of their terms and conditions for working at the aerodrome) ofthe hazards

created by birds and how they can minimise or eliminate bird attractants in their business or work environment.

Bird incident statistics

Collecting data

Part 12, Accidents, Incidents and Statistics, requires the pilot in command of an aircraft to report bird incidents to the CAA of Mongolia. Usually, they do this by passing the details of a bird incident to the nearest Air Traffic Service unit for onward transmission to the CAA, or to the CAA via company reporting systems.

The CAA of Mongolia has adopted the following system for classifying whether a bird occurrence occurred on or off the airport:

"On airport" bird strikes are strikes that occurred at or below 200ft above ground level (AGL) during the landing or approach or 500ft AGL during the take-off or climb. "Off airport" bird strikes are strikes that occurred above 200ft AGL during the approach and above 500ft AGL during climb.

Using this system, the critical information to classify whether an incident is on or off airport is the aircraft's phase of flight and also its altitude.

The CAA of Mongolia provides aerodrome operators with a statistical report and comments about incidents and trends. Some aerodrome operators have also reached agreement with the Airways Corporation of Mongolia to provide data about bird incidents as they are reported. This provides aerodrome operators with up-to-date information and a greater range of useful information such as aircraft type, time of incident, height and speed at which the incident occurred, phase of aircraft flight, bird species if known and the number of birds involved.

This information can be used for in-house analysis of incidents.

Analysing data

Data analysis can help you to determine whether a bird hazard management program needs to be instigated and to make strategic decisions about the actions required to mitigate a particular problem.

Spreadsheet or database software can make analysis more effective and easier than a paper-based system, which can be onerous and more error prone.

In-house analysis can be completed easily if you obtain the data from the Airways Corporation of Mongolia and the CAA. Outline the parameters of the information you are seeking from the CAA.

When analysing bird incidents consider whether they, for example:

- occurred on or off the aerodrome
- involved a predominate bird species
- involved a particular aircraft type
- were concentrated during particular times of the day (which could be due to peak movements of aircraft, rather than birds)
- were seasonal (which could be related to food sources or migratory patterns)

- involved a particular area of the aerodrome (eg, one end of a runway, which could indicate a specific habitat problem area or the migratory habits of the birds)
- happened at a similar height (which might indicate migratory patterns)
- what options are available if bird incidents occur off the airport

This analysis is also useful for measuring the effectiveness of measures being implemented.

Example

Analysing bird incident data, then making appropriate adjustments can lead to fewer bird incidents.

For example, in one case an aerodrome operator and aircraft operator noted that B737 jets were incurring more strikes involving migratory birds, than the larger wide-Codied jets. Investigation revealed that the B737's takeoff point was earlier than the other jet's takeoff point, so the B737 was flying through the birds' path while the larger wide body jet was passing underneath. It was decided to alter the B737's takeoff point so that it too passed under the birds' flight, resulting in fewer strikes.

Evaluating the program

Analysing bird incident data is part of evaluating the bird hazard management program's effectiveness. However, to determine whether the results are indicative of a trend or are merely an aberration, you need to undertake regular monitoring and analysis for some years.

Managing information

It is important that bird incidents are reported so the extent of the bird hazard problem can be determined and stakeholders (such as the aerodrome operator, aircraft operator and CAA) can make informed decisions to manage the risks. Bird incident data is important at local, national and global levels.

In Mongolia a 'bird incident' includes:

- a collision between an aircraft and one or more birds (ie, a bird strike)
- one or more birds passing sufficiently closely to an aircraft in flight to cause alarm to the pilot (ie, a near miss).

Mongolian aerodrome operators are also encouraged to report to the CAA (using Part 12 incident report) when bird remains are found at an aerodrome and it is known or suspected that a bird incident report has not been filed.

Mongolian experience

Statistics

In 2007-2015, there was over 50 bird incidents reported in Mongolia:

Bird species

Analysis of the reported bird incidents indicates the prevalence of a few problem species:

Additionally, many incidents have been reported against 'small birds', 'kite', 'crow' and 'crane' in general.

The last section of this document describes these species and the methods that have been used to successfully control the hazard they pose.

Generally, control methods for small birds are similar no matter what the species. However, if the problem species is not listed above, you may need to consult an ornithologist to help you to establish a dedicated program.

Environmental survey (bird hazard assessment)

One of the first steps when devising a bird hazard management program is to undertake an environmental survey or bird hazard assessment. This survey focuses on the conditions attracting birds to the aerodrome and needs to be completed before any major habitat changes are implemented.

The survey should determine:

- the number of birds hazardous to aviation in the area
- the species of bird in the area
- how the birds are distributed, both spatially and temporally
- why the birds are in the area
- how the birds move in relation to the aerodrome and aircraft flight paths.

It should also assess the area's geography, hydrology, soil, climate and vegetation, building designs and human activities such as agricultural and waste-disposal operations.

This research provides the factual information needed to understand why hazardous species are at the aerodrome and, as a result, suggests the habitat modifications you should consider. In some instances a more comprehensive study of a particular bird species by an expert may be required; at other times a cursory survey will be all that is needed to locate the primary bird hazards.

Keep in mind that a bird hazard management program is about managing risk, not eliminating all the birds from the aerodrome (even if some operators consider this a utopian situation).

It is important to establish birds' habitual behaviour and relationship to the aircraft flight path, because they may not pose a risk in some combinations of circumstances.

Finally, to help assess the effectiveness of the bird hazard management program, consider undertaking a regular (eg, annual) bird census to see whether and to what extent the number of birds is changing. Local members of the Ornithological Society or research students can often be used to undertake this survey on your behalf.

Implications of land use activities near aerodromes

Planning land use near aerodromes

Although you can control the land use practices on your land to reduce the aerodrome's attractiveness to birds; bird-attractive land use activities outside the aerodrome's boundary and beyond your sphere of influence can counter your activities.

Particularly severe problems arise when birds make regular flights across an aerodrome (eg, when they fly between roosts and feeding areas). The greatest problem at many aerodromes is the presence of one or more waste disposal sites near the aerodrome. These facilities provide food for many birds, mainly gulls, which may then use adjacent aerodromes as loafing and resting sites.

Therefore, it is crucial aerodrome operators make submissions during urban planning or district scheme reviews and work with local authorities to ensure bylaws are established, so municipal authorities know that such activities influence bird populations, which can be hazardous to air transportation if near an aerodrome and approach or takeoff flight paths for aircraft.

When hazardous land uses are already established and prohibitions or restrictions are not options, remedial action may be taken, for example:

- inform owners and managers about the hazards created by their operations
- help develop programs to minimize the operation's attractiveness to birds.

Hazardous land use practices

Landfills

Landfills should not be located close to aerodromes, because they are immensely attractive to scavenging birds due to the abundant food source. However, landfills can be made less attractive to birds with:

- overhead wires installed to interfere with the birds' flight path
- the working area of the tip face made as small as possible and, preferably, contained in a pit where access by birds is restricted
- refuse being covered with soil daily to reduce available food sources when the landfill is not operating.

The dumping of food waste should be strictly controlled, with waste covered immediately.

Most active management techniques used at aerodromes can also be used effectively at landfills. Reducing a food source should reduce the bird population.

Wastewater treatment plants

Wastewater treatment plants should also not be located close to aerodromes. These sites normally contain settling or aeration ponds or other expanses of water that attract water fowl and sea birds.

Control methods aim to minimise the attractiveness to birds of the ponds and their environs as resting areas. They include:

- wires erected across ponds

- the gradient of the side slopes of ponds increased to deter birds from resting and to interfere with the birds' flight path to and from the water banks around ponds to obscure the birds' view of predators when they are on the water
- vegetation planted around ponds to reduce the areas available for resting and interfere with the birds' view and flight paths.

When tanks are used, the upper surface should be covered completely or with a wire grid or netting.

Agriculture

Crops

Aerodromes in rural locations are often bounded by areas suitable for agriculture. Even aerodrome operators use parts of their lands for crop production to increase revenues (eg, brassica, corn or root crops or grass to be harvested as supplemental feed).

If cropping is to be conducted at the aerodrome, get advice from plant scientists or ornithologists to gauge the effect it may have on birds in the area. Grains and cereals are major bird attractants, so avoid them whenever possible.

Approach surrounding farmers to discuss the issues related to bird attractant agriculture. Develop good working relationships with the farmers, so you can try to influence the choice of crop planted or at least be kept informed of changes to plantings.

Ploughing and cultivating of the soil attracts gulls and, in the South Island, the black-fronted tern.

To mitigate the bird hazard try to influence the time of day that agricultural work takes place near the aerodrome (eg, try to have it conducted at night, when aircraft traffic is likely to be minimal).

Animals

The rearing of animals can also attract birds, particularly during calving and lambing seasons, which provide an abundant food source for birds.

You can do little to detract birds in these instances, but ask farmers to keep animals away from paddocks neighbouring the aerodrome during this period.

Cattle sale yards also attract birds with their abundant food sources (eg, flies and other insects attracted by the animals). Work with local authorities to ensure such activities are not planned or located close to aerodromes.

Recreational activities

Grounds

Mongolians enjoy a lifestyle that encourages outdoor pursuits, which lead to open expanses of finely mown fields (eg, sports fields including school grounds, parks and picnic areas). These are potentially hazardous land uses, because of the high risk of food waste being left at the sites. Viewing areas at aerodromes, where people farewell others or watch the activity at the aerodrome, are also potentially hazardous land uses for the same reason.

These potential feeding grounds cause birds to fly across the aerodrome or flight path from their roosting site, using the aerodrome as a resting place.

Work with local authorities and sports clubs to minimise the food sources for birds in these areas, by encouraging the careful management of food waste and grounds.

Water

Some aerodromes are situated in river shore. Fishing is popular pastimes for many Mongolians. Assess and control bodies of water if water fowl may be attracted.

Discourage local fishers from cleaning fish or disposing of waste where birds, once attracted, might create a hazard to aircraft.

Contact the local harbour master and fishing clubs to seek their help in eliminating these forms of food source that might create a hazard.

Consider displaying a sign at the local pier to deter people from these activities.

Passive management techniques – habitat modification

Passive management techniques modify the birds' habitat to make it less attractive or unattractive.

The main attractants to aerodromes and their environs for migratory or resident birds are food, water and shelter to feed, rest and nest safely.

Minimising or eliminating bird attractants

Food sources available to birds at aerodromes include food waste, seed-producing and aquatic vegetation, rodents, and invertebrates and earthworms. In all cases monitor the food source carefully and regularly.

Food

Waste

Managing edible waste in garbage is important.

Monitor restaurants and other food outlets at aerodromes to ensure their food wastes are properly contained during disposal.

Monitor carparks, viewing areas and other outside places where people congregate to ensure food waste left in the area does not become attractive to birds. Consider placing signs to discourage bird feeding in these areas.

Vegetation

Measures to control vegetation are discussed later in this document in the section 'Managing ground cover'.

Worms

Worms are a strong attractant to birds of all sizes. When it rains, worms are often seen on paved areas.

A longer term solution is a vermicide spraying program to eradicate the worms. Spray all grass areas or just the area surrounding the manoeuvring area.

Insects

Insects, in larvae or adult form such as grass grub, porina moth and crane fly attract large numbers of birds. You may need expert assistance to identify an insect species being eaten by birds. Often insects are a seasonal problem, mostly around spring and summer.

Consider spraying grass areas annually, targeting these insects when they are evident

Water

Ducks, gulls and shorebirds are particularly attracted to surface and standing water.

Modify or eliminate all physical features that hold standing water, for example:

- drain and backfill pits or depressions that regularly collect water after rain
- clear clogged waterways, especially drainage ditches, because not only are birds attracted by the water for drinking and bathing, they benefit from the insect and aquatic life that flourishes there
- cover bodies of water such as ponds with wire to stop birds from landing
- grade the banks surrounding ponds to discourage birds from resting in the water; they are less likely to frequent areas when they cannot see predators above the bank
- grade ditches so water runs off as rapidly as possible
- cut grass and other vegetation on sloping banks
- replace ditches with underground drainpipes or culverts.

Seek expert assistance from the Department of Conservation if wetland areas are within the aerodrome environs.

Shelter

Aerodromes provide a good place for birds to shelter where they can loaf, perch, roost and nest. Birds often seek the shelter of buildings on roof ledges, towers and aerials. They nest on roofs and ledges, in crevices and holes, in vents and ducts as well as in long grass, shrubbery and vegetation. However, once identified, these habitats can usually be modified to deter birds from sheltering there.

Birds also find safety in open spaces such as on paved areas and open short grass fields that afford clear views of the surroundings, so birds can see approaching predators.

Paved areas retain heat, so provide warmth during the evenings at certain times of the year.

Paved areas are also a hard surface onto which birds can drop shells and the like to break them and get at the food source inside.

Exclusion techniques

Netting

Netting can be used in a variety of indoor and outdoor areas to stop birds from entering an area to feed, roost or nest.

Netting is often used:

- in the open ceilings of buildings or across spouting
- across small ponds and drainage ditches

- over small areas of earthworks to prevent birds foraging for worms, insects or new seed
- over small to medium trees to discourage birds from roosting (although other visual bird deterrents are often more aesthetically pleasing).

However, netting can become a hazard if it becomes free and lodges in aircraft engines. Therefore, it is not recommended for use near aircraft movement areas.

Wire

Wire can be used in a variety of ways to exclude birds from specific areas.

Place wire about 0.75 m to 1 m from the surface to interfere with the birds' landing approach. Place the wires in a grid of about a square metre or more depending on the targeted species. This is effective on flat roofs and across aeration ponds for medium to larger birds. However, it is not practical against small bird species.

Wires placed much higher above the surface have been used in some locations such a refuse sites. This interferes with the bird's flight pattern and discourages it from the area.

Use wire or metal spikes set in clusters or an extended strip to deter birds, particularly smaller species, from landing on building ledges or on top of aerial towers or power poles. The spikes make it impossible for the bird to land.

Chemical

Chemicals used for exclusion purposes are usually sticky substances (ie, tactile repellents) that deter birds from roosting on ledges and other flat surfaces. Although effective in the short term they require reapplication (often annually) to maintain their effectiveness.

Consider whether such areas will be accessed frequently by people (eg, during preventative or regular maintenance routines).

Managing ground cover

Grass management

All aerodromes have grassed areas, which are major attractants to birds, primarily for feeding, but also for loafing and sometimes nesting.

The most effective grass management technique depends on the problem bird species.

You need to also consider the environment, including the soil type and climate, in which the grass will be grown. The grass type that best matches the management technique also needs to match the environment in which it is to be planted.

Weeds provide another food source and cause less dense patches of vegetation, where birds can rest, so a thick sward of grass is ideal.

While you can modify the soil (eg, by applying fertiliser), you cannot influence the climate. Get assistance from local farmers, seed suppliers, local authority parks and reserves staff, green keepers or scientists specialising in grass management when choosing the grass.

Grass requires constant attention with mowing, weed spraying, and fertiliser and pesticide application. However, this effort can result in an effective long-term solution to control birds.

The best grass height depends on the bird species being targeted. Short and long grass management techniques have advantages and disadvantages.

Long grass technique

Use long grass to discourage birds that like wide open spaces where they can see any threat or predator approaching. Although this is the case for most birds, it is particularly so for the spur-winged plover and black-backed gull.

It is important the grass grows thickly to be most effective as a deterrent. Cut the grass low and apply fertiliser before spring to maximise the benefit obtained during spring growth and encourage the grass to grow densely.

The grass should be about 30–40 cm in height, but not left to go rank, which creates a thatching effect across the ground, negating its purpose.

Do not allow seed heads to develop, attracting birds.

Take care to ensure the grass does not obstruct visual navigation aids or signs.

Long grass will deter larger birds such as plovers from feeding and loafing in these areas. Smaller birds such as starlings, sparrows and finches, larks will not be attracted to the longer grass unless it begins to seed. However, birds such as the goose and shelduck feed on grass, particularly when grain, pea and cereal crops are not available. They are particularly attracted to new grass growth.

Birds such as ducks gulls have also been known to build nests in longer grass.

Long grass can also attract rodents. Careful monitoring is required to ensure rodents do not become a food source attractive to another species such the buzzard, falcon or become a wildlife hazard themselves.

Short grass technique

Use short grass to discourage rodents and other wildlife that might find refuge or protection in longer grass.

The optimum grass length to deter smaller bird species and discourage rodents is about 15– 20 cm.

The disadvantage of this technique is that it creates suitable areas for larger bird species to loaf and feed.

Combination long and short grass techniques

Some aerodromes have adopted a combination of long and short grass. Grass is grown long around the runway and taxiway areas, but kept short in outer areas.

Another technique that has been trialled was to grow long grass in strips of about 1–2 m wide at right angles to the runway with about 20 m of short grass between strips. The objective of this method was to make sure birds could not see approaching threats or predators when they were in the short grass, so were discouraged from being in those areas. However, the grass used could not be grown to a sufficient height or density to provide a suitable visual barrier. With the right grass, however, this technique should work.

Planting out

Another way to modify a bird's habitat is to plant out the area being used by the birds.

In one case, the site modified was not at the aerodrome, but was the nesting site for a colony of black-backed gulls that crossed the flight path of aircraft every day, flying to and from their feeding sites. As part of a longer term plan, the site was planted in native trees to discourage thebirds, which prefer nesting in pasture land. This has reduced the available nesting sites and shifted the bird population away from the area.

Active management techniques

Active management techniques do not modify the birds' habitat; they aim to disperse the birds (ie, visual or auditory deterrents) or remove them (ie, elimination and relocation).

If large flocks of birds are evident on the aerodrome and cannot be effectively dispersed from the area, the aerodrome operator should issue a NOTAM to advise flight crews of the potential hazard.

Dispersal techniques

Birds quickly become accustomed to deterrents that are used excessively or exclusively. Therefore, it is important to use a range of deterrents and to change the location of deterrents regularly and randomly to maintain their effectiveness. Combining dispersal techniques with removal will also keep the birds wary of the deterrent.

Migratory birds can pose additional dispersal challenges, because of their transient nature. Close examination of their flight paths and habits is required. This information should be published in the *Mongolian Aeronautical Information Publication* or notified directly to aircraft operators.

Visual deterrents

Visual deterrents are placed in the aerodrome environs to make a particular bird species so uncomfortable they leave the area.

Kites

Kites have been used to good effect to scare birds, especially kites in the form of predatory birds. This is a more effective control against smaller birds.

It is important such items are well tethered and do not pose a threat to aircraft

Statues

Statues of predatory birds have been used to limited effect against smaller bird species.

Items that dazzle

Items that dazzle birds are effective at dispersing birds to other areas (eg, tinsel strips, streamers on strands of wire from multiple electric fence standards, or rotating shapes with shiny surfaces).

Use such devices cautiously to ensure pilots are not dazzled.

Hanging items in trees

Metal cat faces with prominent eyes hung in trees or shrubs have also been used to good effect to discourage smaller birds from roosting or nesting.

Patrols

Use vehicle and people patrols in areas where birds congregate.

However, if birds become accustomed to vehicles they will stay just out of its range without dispersing.

Dogs

Dogs trained especially for bird scaring are used effectively in the United States. The dogs are screened for their suitability and trained on military and civilian aerodromes, so they become accustomed to operating around various aircraft.

However, exercise extreme caution to ensure dogs do not become a hazard. Dogs are best used during periods of no aircraft activity.

Pyrotechnics

Pyrotechnics are effective visual and auditory deterrents – a flash of light and an explosive noise. As with other deterrents excessive use can reduce their effectiveness.

Pyrotechnic cartridges such as Bird Frite cartridges are fired from shotguns. Operators must be properly trained in their use.

Exercise caution when using pyrotechnics near the manoeuvring area. Coordinate with Air Traffic Control units to ensure aircraft safety is not further compromised.

Auditory deterrents

Auditory deterrents target the birds hearing to cause distress in the bird.

Ultrasonic devices

Ultrasonic devices transmit noises above the range of human hearing and cause birds distress.

They have been used effectively, predominately in hangers.

Bird distress and predatory bird calls

Playing bird distress calls over loud speakers, targeting a specific bird species, has been used effectively. Playing predatory bird calls has some effect against smaller birds.

However, play bird distress calls cautiously, as some bird species (eg, magpies) are attracted to the calls of their own species. Seek expert assistance to ensure birds will disperse and not attract more birds to the area.

Pyrotechnics

As discussed above, pyrotechnics are effective visual and auditory deterrents.

Removal techniques

Removal techniques include elimination and relocation. However, authorisation is often required to kill or disturb bird species.

Protected species

Wildlife Act

The Wildlife Act regulates the control and protection of wildlife. It sets out, among other things, levels of protection for birds. Birds in Mongolia are protected unless listed in the Act's Schedules. The Schedules of relevance to the control of birds at aerodromes are:

- Schedule 1 – Wildlife declared to be game
- Schedule 2 – Partially protected wildlife
- Schedule 3 – Wildlife that may be hunted or killed subject to Minister's notification

View the Act at http://www.legalinfo.mn/

Many problem species at aerodromes are protected under the Act. Species such as the demoiselle crane, black kite, carrion crow, and buzzard are not listed, so are protected. Other species such as the duck, goose and daurian partridge are listed as game birds.

Therefore, it is important to obtain authorisation before eliminating any protected bird species at the aerodrome, regardless of the birds' stage of development (ie, embryo, juvenile or adult).

Authorisation

Obtain authorisation to kill or disturb a protected species from the local Ministry of Environmnt, Green Development and Tourism of Mongolia, stating which birds you are seeking to control.

Such authorisation is likely to be subject to conditions. It is usually preferred that all attempts using alternative methods are tried before protected birds are killed, and only then is killing authorised if the birds are constituting a hazard to the safe operation of aircraft. The number of birds killed is to be kept to a minimum.

Record killed birds with leg bands and send their details to the Department of Conservation.

Any unusual species killed might also need to be frozen, pending further notice by the Department of Conservation.

Maintain accurate records when this authorisation is invoked. You will need to send details at least annually to the Department of Conservation.

Relocation

For protected bird species that are rare or have some other particular significance, seriously consider capturing the birds and relocating them away from the aerodrome.

Trapping or netting can be attempted with help from the Department of Conservation, local animal welfare agencies or expert ornithologists. The objective is to capture the bird with the minimum of stress and harm for the bird.

One disadvantage is that most birds have strong homing instincts and can return to areas from where they were trapped in a short time. Seek expert guidance.

Although not protected or rare, magpies have been successfully relocated to other territories. However, be cautious when caging or netting magpies, as their distress calls will attract other magpies.

Targeting eggs and juveniles

Eggs

Reduce the local population of a bird species by searching for nests and destroying eggs. This has the long-term effect of reducing the number of breeding birds and the number of juvenile birds in the air.

A continual failure in breeding at a particular site will lead to some bird species leaving the area.

Care needs to be taken, however. Different bird species react differently to the destruction of their eggs. The carrion crow, black kite, demoiselle crane will continue to lay if one clutch of eggs is destroyed or removed. Therefore, breaking eggs in the nest can inadvertently extend these birds' breeding season. On the other hand, steppe eagle is likely to leave the nest.

Obtain expert assistance to undertake this method of control. It is also wise to use a dye in the solution injected, so if anyone takes the eggs, it will be evident when the egg is broken that the content is inedible.

Some aerodromes have used mechanical means to destroy the eggs of ground nesting birds. A vehicle towing harrows, a roller or a leveller or objects such as a piece of railway iron, a wire gate or several tyres tired together can be effective. Take care not to damage any other aerodrome infrastructure such as lighting or signs.

Juveniles

Nestling chicks can be killed in the nest and removed from the site.

Juvenile birds, particularly gulls, ducks and plovers, may pose an increased hazard to aircraft compared with adult birds as they have not developed a cautious awareness of aircraft and are less agile or predictable in flight. Targeting younger birds when shooting could reduce this risk.

Elimination

The most permanent solution to any bird hazard is to kill the problem birds by shooting them or poisoning them directly or indirectly (ie, through their food).

Shooting

Shooting birds is not always easy to implement. Birds can become cautious, recognising specific vehicles transporting shooters, and can remain outside the danger zone making it difficult to approach them. Some aerodromes have increased their chances of success in implementing this approach by a number of methods. Using game bird hunters has been successful; as has using helicopters to shoot the birds while they are on the ground either congregating generally or during the moult.

Extreme care needs to be taken when using live ammunition, particularly when shooting on or near an aerodrome.

Poisoning

Another method to eliminate problem birds is poisoning. The use of Alphachloralose by registered users is the most effective method for killing large numbers or specific pockets of birds.

Monitor the birds' habits to determine the best location and method for applying the poison.

Familiarise the birds with the food source and to test their acceptance of the bait in a series of baiting sessions. It may be necessary to encourage the birds to feed at a different time of day to reduce the geographical spread of dead birds. This might be achieved by encouraging the birds to feed before roosting or nesting for the evening.

Careful planning is required to minimise the number of non-target species killed.

This method has been known to work successfully with pigeons, starlings and ducks.

Partnerships

Bird hazard management programs are most effective when all stakeholders are involved in their development and implementation.

Expert assistance

Ornithologists can provide consulting services to help develop bird hazard management programs. (Some also specialise in wildlife hazard management.) Local ornithologists can advise you and carry out the ecological survey and annual bird counts.

For ornithologists in your district, contact the Mongolian Ornithological Society, PO Box 537, Ulaanbaatar 210646A or info@mos.mn, www.mos.mn

Scientists from Landcare Research or universities can help with managing soil, grass and food sources at aerodromes.

Pest destruction agencies usually also cater for smaller species of birds, generally in and around buildings.

Local authorities

Local authorities are responsible for planning land use activities, and setting bylaws and for wastewater treatment, landfills and parks and reserves including sports fields.

Local authorities should be told about the hazards and encouraged to develop land use restrictions and management techniques to minimise the presence of birds near aerodromes.

Department of Conservation

The local Conservancy Office of the Department of Conservation is charged with managing the wildlife in its region. Staff authorise the disturbing or killing of problem protected species and provide information about specific species (eg, their habitat, food sources, populations and colony sites and control methods). Staff can also help with ecological studies.

The Department of Conservation worked with aerodrome operators to reduce a problem species, kite, crane, duck, crow, which in turn helped to re-establish native birds in the general area.

Interested parties

Other interested parties are often willing to help you if it will be mutually beneficial. For example, the Mongolian Ornithological Society and other environmental Society may help with ecological surveys, species identification and population counts and universities may help with researching birds, animal behaviour and soil, crop or pasture management.

Graduate students may be undertaking independent field research that is relevant to the bird hazard management program and may be willing to share information or trial new techniques with aerodrome operators.

Communication and the media

Communication plays a big part in any bird hazard management program. This is particularly important if you are about to implement a control program that extends beyond the aerodrome's boundaries and is aimed at reducing the population of a particular species.

The public does not usually view an active reduction in bird numbers favourably. Therefore, you need to manage the media carefully. To help minimise negative publicity, emphasise the program's safety aspects and the alternative measures that have been taken. Consider whether it would be better to do this before or after you have implemented the program.
Consider using communication professionals to minimise the negative impact on the industry in general.

Sometimes local authorities will require you to place advertisements in local newspapers, distribute fliers, or place signs at strategic locations to advise the public about the control program. If this is the case, provide a contact name and number on the advertisement, flier or sign, so pubic enquiries can be dealt with consistently by an informed person.

Other information sources

Information is paramount when developing a bird hazard management program. All aerodromes operators share similar problems, albeit to differing degrees. Network with other operators to keep abreast of new techniques and share experiences with problem species.

Additionally, the International Civil Aviation Organisation has published a generic document on bird control and reduction, Airport Services Manual (Doc 9137-AN/878), which you can get from the CAA.

Detailed information is also available on the internet. A particularly good source is Transport Canada (responsible for civil aviation in Canada), which has published comprehensive documents on bird hazard management particularly for aerodrome operators. Download Transport Canada's *Sharing the Skies: An Aviation Industry Guide to the Management of Wildlife Hazards or Wildlife Control Procedures Manual* or other documents fromhttp://www.tc.gc.ca/en/menu.htm. Other similar agencies also publish on relevant topics.

Get books on birds of Mongolia from local book shops or libraries to help you recognise and better understand a particular bird's preferred habitat and food source.Include UK CAP 680, US Department of Agriculture – Wildlife Hazard Management at Airports (Richard Dolbeer and Ed Cleary)

Appendix 1

Specific species – descriptions and control methods

The synopses that follow outline the status (protected, unprotected or game bird) of the 15 problem bird species and describe the adults and juveniles, breeding and nesting habits, other characteristics and the most effective methods for controlling them. The species are the:

- Ruddy shelduck
- Mallard
- Black kite
- Saker falcon
- Common kestrel
- Daurian partridge
- Demoiselle crane
- Rock pigeon
- Small passerines (horned, mongolian and short-toed lark)
- Common starling
- Common magpie
- Red-billed chough
- Rooks
- Carrion crow

Ruddy shelduck

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor, passage migrant, and wintering. Occurs almost every single water point throughout the country.

Description – adult

- Rusty-orange plumage with pale head.
- Bill- black.
- Feet- black.
- Grown height – 58-70 cm.

Male

- Adult has narrow black neck-ring.

Female

- Head – paler.

Description – juvenile

- Head- dull brown with buffish-tinge.
- Upper parts- dull brown.
- Underparts- rusty orange
- Resembles adult male.

Breeding and nesting habits

- Breeding season late April to early May, continues into August.
- Nesting starts in August; nests hidden in depression on ground or in hollows or trees, near pond, lake, river.
- Lays 8–12 creamy white eggs;

Other characteristics

- Graze aquatic and terrestrial green plants in wet meadows, marshes and wetlands.
- Feeds on insects, fishes, frogs, worms.
- Flocks during moult in late summer, usually around lakes and ponds.
- Flightless during the moult.
- Large flocks consisting of 20-8000 birds gather in large lakes and wheat fields.
- Some birds wintered in unfrozen lakes and rivers.

Methods for controlling species

- Use long grass management technique and careful selection of grass type.
- Use vermicide and pesticide on manoeuvring area grassed surfaces Use pyrotechnics (eg, Bird Frite) and live shells.
- Netting over water ponds, drainages.

Mallard

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor, passage migrant, and wintering. Occurs almost equal all over Mongolia.

Description – adult

- Wide individual variation in density of markings.

- Grown height – 50-60 cm.

Male breeding plumage

- Head – glossy green with white collar ring.
- Upper breast – chestnut.
- Under parts – finely streaked silvery grey.
- Wings – grey with bright blue patch with white margins.
- Iris – dark brown.
- Bill – yellowish green.
- Legs – orange.

Male eclipse plumage (late summer and autumn)

- Similar to female, but olive green bill.

Female

- Chin, throat and front of neck – light buff.
- Upper body – brown, streaked and spotted with lighter markings.
- Eyes – irregular dark line through them.
- Wings – similar to male.
- Bill –orange-brown.
- Legs – orange.

Description – juvenile

Duckling (two to three weeks old)

- Blackish brown.
- Face – yellow.
- Eyes – dark line through them.

Juvenile

- Similar to adult female, but duller.

Breeding and nesting habits

- Breeds September to December.
- Nests commonly in rank pasture grasses or under bushes close to water; may nest under logs and buildings.
- Lays an average 12 eggs, cream with light green tinge; may lay again if first clutch of eggs lost.

Other characteristics

- Feeds on plants or small insects mainly aquatic invertebrates; ripening grain

Methods for controlling species

- Use short grass management technique during breeding season.
- Use vermicide and pesticide on manoeuvring area grassed surfaces.
- Use pyrotechnics (eg, Bird Frite) and live shells

- Netting over water ponds, drainages.

Black kite

Global conservation status; Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor, passage migrant. The occurrence is equal throughout Mongolia.

Description – adult

- Upper surface – dark brown.
- Under parts – light yellowy-buff with streaking.
- Eye ring –grey.
- Iris – light brown.
- Bill – dark.
- Legs and feet – yellow.
- Claws – dark.
- Grown height – 55-68 cm.

Older male

- Wings – often dark brown.

Description – juvenile

Nestling

- Down – buff grey
- Feet –yellow.

Immature bird

- Similar to adult, but buffish mottled on upperparts

Breeding period

- Nests on rocks, cliffs and trees, mainly in river valley and urban areas.
- Lays April to early May; usually 3-4 white blotched with reddish or purplish-brown eggs.

Other characteristics

- Bird of prey.
- Feeds mainly on voles, gerbils, mouse, hedgehogs, and small birds, and also scavenging leftovers of human food and carrion.

Methods for controlling species

- Use short grass management technique.
- Use pyrotechnics (eg, Bird Frite)

- Remove or hide died animals.
- Gain local council support for managing refuse sites and playing fields to minimise food sources.

Cinereous Vulture

Global conservation status; Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor, passage migrant and winter visitor. The occurrence of the species is almost an equal throughout Mongolia.

Description – adult

- Plumage- blackish brown with very pale- brown ruff
- Eye ring –pinkish.
- Iris – dark brown.
- Bill – dark with yellow base and pale pinkish cere.
- Legs – pale grey with pinkish-tinge.
- Grown height – 100-120 cm.

Description – juvenile

Immature bird

- Similar to adult, but uniform black plumage than adult, with black head and ruff (almost black head).

Breeding period

- Nests on trees, cliffs and breaking rocks on mountain slopes.
- Builds a large stick nest by twigs, stems of dried Caragana and other bushes.
- Lays early March to April; usually 1 dull white or buffish with grayish blotches and spots egg.

Other characteristics

- Scavenger.
- Feeds on carrion together with other vultures. During the feeding on new kill, sometimes more than 100 individuals a gather at a place.

Methods for controlling species

- Use pyrotechnics (eg, Bird Frite)
- Remove or hide died animals.
- Gain local council support for managing refuse sites and playing fields to minimise food sources.

Saker falcon

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor, passage migrant and winter visitor. Only adult falcons winter in Mongolia following active Brandt's Vole colony and wintering passerines.

Description – adult

- Plumage- very variable, pale head, poorly marked narrow moustache.
- Upper parts- buff to grey with cream, brown, reddish brown and dark brown marking.
- Under parts- whitish with variable dark markings.
- Grown height – 47-57 cm.
- Male is slightly smaller, lighter and less barred than female.
- Bill – Dark grey with yellow cere.
- Legs – bright yellow.

Description – juvenile

- Bill- dark grey with bluish grey cere.
- Legs- bluish grey.

Breeding and nesting habits

- Breeding season is late April to early June.
- Doesn't build own nest.
- Nests in old or newly built nests of Northern raven, Upland buzzard, Steppe eagle, Black kite placed on cliffs, electric poles, trees, buildings, sandy precipices.
- Lays 3-4 eggs, reddish brown with dark brown spots, blotches.

Other characteristics

- Hunts small passerines such as Horned lark, Greater short-toed lark, Mongolian lark and voles, gerbils, pikas.

Methods for controlling species

- Use short grass management technique;
- Use pyrotechnics (eg, Bird Frite)

Common kestrel

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor, passage migrant and wintering species. The density is an equal throughout Mongolia.

Description – adult

Male

- Head- bluish grey.
- Tail- has black tips.
- Plumage –
- Upper parts- heavily marked with black.
- Eye rings – yellow.
- Iris – black.
- Bill – dark grey with bright yellow cere.
- Legs – bright yellow.
- Grown height – 27-35cm.

Female

- Head – rufous crown.
- Upper parts- rufous, heavily marked with black
- Tail- has dark barrs
- Similar to female Lesser kestrel, but claws are black.

Description – juvenile

- Similar to female, but under parts rufous brown.
- Iris – black.
- Bill –dark grey with bright yellow cere
- Legs– yellow.

Breeding and nesting habits

- Breeds in late May to early June.
- Nests in holes, narrow channels of rock, cliff and man-maid substrates and nests of other birds such as Carrion crow, Common magpie, black kite.
- Lays; 4-5 eggs, non-glossy yellowish buff colour with reddish brown, purple blotches and marking.

Other characteristics

- Hunts small voles, grasshoppers, crickets, and young fledglings of small passerines.
- Varies diet to suit environment.
- Often occurs singly.

Methods for controlling species

- Use short grass management technique.
- Use pyrotechnics (eg, Bird Frite)
- Place netting over holes in buildings.

Daurian partridge

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Resident breeder in mountain range. The abundance in the north of the country is a comparatively higher than in the south.

Description – adult

- Plumages- buffish brown
- Bill – pale to dark grey.
- Feet- pale yellowish
- Grown height – 28-32 cm

Male

- Face- orange rufous.
- Upper parts – buffish brown.
- Under parts – ashy grey with large black “U shaped” belly-patch.

Female

- Whiskers and lacks breast-patch rufous.

Description – juvenile

Similar to adult female, but lacks distinctive black patch on belly.

Breeding and nesting habits

- Breeds in mountain with rock boulders, dense scattered bushes and river valley.
- Breeds in April to July;
- Builds a nest on the ground with tall vegetation, dense shrubs and bush on rocky slopes.
- Lays 8 15 eggs, glossy, uniform shades of buff, brown or olive, occasionally with tiny dark spots.

Other characteristics

- Young hatch fly at 16-18 days.
- Feeds on seeds, roots, flowers, buds, juicy leaves and other parts of green plants.
- Flocks feed on low slopes with thin snow cover and abundant food in winter.

Methods for controlling species

- Use short grass management technique.
- Use vermicide and pesticide on manoeuvring area grassed surfaces.
- Use pyrotechnics (eg, Bird Frite), live shells.
- Shoot flocksen masse to reduce population.

Demoiselle crane

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor and passage migrant.

Description – adult

- Head- black with grey crown.
- Neck- black with white tuft behind eye.
- Upper and under parts- grey.
- Eye rings – light grey; iris – red.
- Bill – dark grey with reddish brown tip..
- Legs – dark grey.
- Grown height –80-100 cm.

Description – juvenile

Nestling

- Body – buff brown
- Head yellowish
- Iris – black
- Legs- grey.

Immature

- Similar to adult, but has dark grey head and neck, less prominent grey tuft behind eye and grey-brown cast to upperparts.

Breeding and nesting habits

- Breeds May to June same territories yearly.
- Builds a nest on ground in areas of short vegetations in forest stepp, mountain steppe, desert steppe, plains.
- Lays 2 eggs, slightly glossy, pale buff, olive grey, buffish brown with dark brown blotches and spots.

Other characteristics

- Feeds on grasshoppers, worms, roots, leaves, buds and flowers.
- Large flocks consisting of 4000-8000 individuals occur along steppe lakes and wheat fields on migration.

Methods for controlling species

- Use long grass management technique.
- Use vermicide and pesticide on manoeuvring area grassed surfaces.

- Use pyrotechnics (eg, Bird Frite).

Rock pigeon

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence: Resident breeder.

Description – adult

- Plumage – varies.
- Throat, upper breast, side of neck – metallic green or purple.
- Breast and rump – light grey.
- Iris – reddish brown
- Bill – dark grey.
- Legs and feet – bright red.
- Grown height – 29-35 cm.

Description – juvenile

- Like adult, but has dull plumage and buffish-fringes on upper and under parts.

Breeding and nesting habits

- Nest on ledges of buildings and rocks
- Breeds throughout the year, peaking in spring and summer;
- Lays two white eggs.

Other characteristics

- Travels in flocks.
- Often travels long distances between roost and feeding grounds in rural areas.
- Feeds on grains, cereals, peas, worms, slugs, snails, and bread (from people).

Methods for controlling species

- Use short grass management technique and careful selection of grass type.
- Use vermicide on manoeuvring area grassed surfaces.
- Use pyrotechnics (eg, Bird Frite) and live shells.
- Poison flocks (with Alphachloralose) by baiting feed.
- Place wire spikes on ledges and netting over holes in buildings.

Small passerines (Horned, Mongolian and Asian short-toed lark)

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Horned lark and Mongolian larks are Resident breeders, Shor-toed lark is Breeding visitor, passage migrant, and wintering. The occurrence of them is different depending on habitat (weather, food recourse).

Description – adult

Horned lark

- Head- black and white, elongated black narrow horn-shaped feater on sides of crown.
- Upper parts- pinkish brown
- Under parts- white
- Grown height – 14-17 cm (larger than sparrow)
- Bill- black
- Feet- dark
- Resident breeder, large flocks occur in winter.

Mongolian lark

- Head- white and chestnut brownish
- Upper parts- grayish brown
- Under parts- white
- Bill – yellowish
- Feet- reddish brown
- Wings- secondary primaries are white and black
- Grown height – 18-22 cm (larger than other larks)

Asian short-toed lark

- Upper and under parts– buffish brown
- Bill- upper mandible dark grey, lower mandible yellowish
- Feet- brown
- Grown height – 13-14 cm (larger than sparrow).

Breeding and nesting habits

- Lays three to five eggs.

Horned lark and Mongolian lark

- Resident, breeds May to June.
- Nests on the ground under grasses, short bushes.

Asian short-toed lark

- Migratory, breeds May to July.

- Nests on the ground under grasses, short bushes

Other characteristics

Horned lark

- Feeds on insects and seeds.
- Flocks in winter.

Mongolian lark

- Feeds on seeds, invertebrate, insect, larvae.
- Flocks in winter.

Asian short-toed lark

- Feeds on insects, invertebrate, larvae, seeds and buds.
- In Autumn migration and winter, they tend to stay in open dry steppe, tall grassed large river valley, dry mountain valley.

Methods for controlling species

- Use short grass management technique.
- Use vermicide and pesticide on manoeuvring area grassed surfaces.
- Use pyrotechnics (eg, Bird Frite) and live shells.
- Shoot flocksen masse to reduce population.

Common starling

Global conservation status; Least concern

Regional conservation status: Least concern

Status and occurrence: Breeding visitor, passage migrant.

Description – adult

- Grown height – 20-22 cm.

Male – autumn

- Plumage – blackish with green and purple sheen.
- Iris – dark.
- Bill – dark.
- Legs – reddish brown.

Male – summer

- Whole bird – metallic green with very small yellowish-white spotting and short tail.
- Bill – becomes yellow and mandible blue grey at base.

Female

Similar to male, but:

- Bill- pale base (not blue grey)

Description – juvenile

- Upper parts – uniform greyish brown flecked with brown.
- Under parts – brown.
- Bill – brownish black.

Breeding and nesting habits

- Breeds late May to early June.
- Nests in holes in trees, cliffs, banks, buildings.
- Lays 5-7 eggs, pale light blue eggs.

Other characteristics

- Feeds on worms, anthropods, other invertebrates and their larvae, fuits and seeds.
- Prefers open pasture, but avoids tall grass.
- Feeds and migrates in flocks.

Methods for controlling species

- Use long grass management technique (ie, grow grass 20 cm or longer).
- Use vermicide and pesticides on manoeuvring area grassed surfaces.
- Use pyrotechnics (eg, Bird Frite) and occasional live shells.
- Place netting over holes in buildings.
- Use moving visual deterrents (eg, kites, tinsel or metal cat faces hung in trees).
- Poison flocks' feed.

Common magpie

Global conservation status; Least concern

Regional conservation status: Least concern

Status and occurrence:

Resident breeder. The number of species increases to the north.

Description – adult

- Plumage- black and white (distinctive)
- Head – metallic glossy black
- Tail: distinctive long graduated black
- Wings –black glossed with green or blue, and the primaries have white inner webs
- Eyelid – black.
- Iris – dark.
- Bill – black.
- Feet – black
- Grown height – 44-46 cm.

Description – juvenile

- Upper parts – duller plumage, less glossy colouration,
- Under parts – similar to adult
- Tail: shorter than adult.

Breeding and nesting habits

- Builds nests late April to early May; nests on tree
- Lays 5-8 glossy pale blue or greenish-blue eggs.

Other characteristics

- Feeds on various terrestrial invertebrates, beetles, grasshoppers, crickets, amphibians, reptiles, eggs and chicks of birds, small mammals, and carrion. During seasonal movements and winter, they forage seeds, fruits, berries of various plants and leftovers of human food.
- Lives in groups.
- Territorial.

Methods for controlling species

- Use long grass management technique.
- Use pyrotechnics (eg, Bird Frite) and live shells.
- Trap birds (by cage) for relocation to other areas.
- Remove nests or cut trees.

Red-billed Chough

Global conservation status: Least concern

Regional conservation status: Least concern

Status and occurrence:

Resident breeder. The occurrence is an equal across Mongolia.

Description – adult

- Body– glossy black plumage.
- Iris – dark.
- Bill – red, long and down-curved.
- Feet – red.
- Grown height – 30-40 cm.

Description – juvenile

- Body-Similar to adult
- Iris – dark.
- Bill – orange and shorter than adult.

- Legs – black.

Breeding and nesting habits

- Builds nests early March; nests on cliffs, crevices, under overhangs, in a crevice and holes or caves.
- Lays early April; 3-4 eggs, glossy very pale-tinged greenish, creamy.

Other characteristics

- Feeds on terrestrial invertebrates such as insects, spiders, earthworms, and snails taken from the ground. Eats vegetable matters, including fallen grain, seeds, fruits, and leftovers in garbage dumps during seasonal movements and in winter.

Methods for controlling species

- Use long grass management technique.
- Place netting over holes in buildings.
- Use pyrotechnics (eg, Bird Frite).

Rook

Global conservation status; Least concern

Regional conservation status: Least concern

Status and occurrence:

Breeding visitor, passage migrant and wintering species. The occurrence is an equal all over Mongolia in breeding and on migration.

Description – adult

- All plumage glossy black.
- Similar to Carrion crow, but differs by pale bare-skin around bill-base, straight pointed bill, peaked crown.
- Iris – black.
- Bill –black with pale bare- base.
- legs – black.
- Grown height – 44-46 cm.

Description – juvenile

- Very like Carrion crow, but distinguished by pointed and straight bill, small bare-skin at base upper mandible.

Breeding and nesting habits

- Very like Carrion crow, but distinguished by pointed and straight bill, small bare-skin at base upper mandible.

- Nests built in top of natural deciduous, conifer and planted trees.
- Colonies are formed in groups adjacent larger trees and nests close to each other.
- Breeds mid to late May.
- Lays 3-5 eggs, glossy light blue, bluish-green marked with greenish-buff, olive mottles and spots.

Other characteristics

- Feeds on invertebrates, plant matters, grasshoppers, crickets, spiders, earthworms, snails, seeds, fuites and carrion.
- Youngs remain in family and flocks in autumn.

Methods for controlling species

- Use long grass management technique.
- Use vermicide and pesticides on manoeuvring area grassed surfaces.
- Use pyrotechnics (eg, Bird Frite) and occasional live shells.
- Destroy eggs and nests during breeding season.
- Shoot flocks from helicopters.

Carrion crow

Global conservation status; Least concern

Regional conservation status: Least concern

Status and occurrence:

Resident breeder. The occurrence is an equal across Mongolia. The density in the south is lower than other areas of the country.

Description – adult

- Body – glossy black plumage. Similar to immature Rook (see description of Rook) and Common Raven, but differs by smaller size, square-shaped tail(not wedge-shaped), less-curved short stockier bill, short nasal bristles, and lacks shaggy “trousers”.
- Iris – dark.
- Bill –black.
- Feet – black.
- Grown height – 40-50 cm

Description – juvenile

- Body – Similar to adult
- Iris – dark.
- Bill – black
- Legs – black

Breeding and nesting habits

- Builds nests late April; nests on deciduous and conifer trees, ledge of cliffs or rocky outcrops; usually returns to same nesting site as previous year.
- Lays early to late May; 4-6 eggs, slightly glossy blue and bluish-green with greenish-buff.

Other characteristics

- Preys on terrestrial invertebrates, carrion, leftovers of food, and plant matters. Wintering flocks forage at garbage dumps near town and city.

Methods for controlling species

- Use long grass management technique.
- Use pyrotechnics (eg, Bird Frite).
- Remove or hide died animals.
- Gain local council support for managing refuse sites and playing fields to minimise food sources.

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