Seychelles Civil Aviation Authority
## AMENDMENTS

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Introduction

The risk of a birdstrike and potential increase of the birdstrike risk due to the presence or development of bird-attractant features on, or in the vicinity of, an aerodrome, shall be assessed through:

a) the establishment of a mechanism for recording and reporting bird strikes to aircraft; and

b) the collection of information from aircraft operators, airport personnel, etc. on the presence of birds on or around the aerodrome constituting a potential hazard to aircraft operations.”

When a birdstrike hazard is identified at an aerodrome, the appropriate authority shall take action to decrease the number of birds constituting a potential hazard to aircraft operations by adopting measures for discouraging their presence on, or in the vicinity of, an aerodrome. ICAO Annex 14 (vol 1) particularly states, “the appropriate authority shall take action to eliminate or to prevent the establishment of garbage disposal dumps or any such other source attracting bird activity on, or in the vicinity of, an aerodrome unless an appropriate aeronautical study indicates that they are unlikely to create conditions conducive to a bird hazard problem.”

The term "in the vicinity" is taken to be land or water within 13KM of the aerodrome reference point, and "garbage disposal dumps" refers to landfill sites (i.e. the disposal of waste by landfill) as defined under relevant Seychelles legislation. An "appropriate aeronautical study" is taken to be a study that focuses on the potential flight safety implications at the relevant aerodrome(s) that an existing or proposed bird attractant development may cause. Such a study should consist of the overall assessment of the ambient birdstrike risk at the aerodrome and a site-specific risk assessment relating to any development or site in the vicinity. An "appropriate authority" is deemed to be an authority that has the power to take action in a particular situation.

The aerodrome licence holder shall take all reasonable steps to secure that the aerodrome and the airspace within which its visual traffic pattern is normally contained are safe at all times for use by aircraft. The licence holder is therefore responsible for the development and implementation of birdstrike risk control measures. This document provides guidance on how the risk of a birdstrike at, or in the vicinity of, an aerodrome may be assessed and what risk reduction measures may be taken to comply with the licensing criteria specified in the Seychelles Manual of Aerodrome Standards (SMAS), which are based on ICAO Annex 14 SARPs. Birdstrike risk management shall be an integral part of the aerodrome operator's safety management culture and its safety management system (SMS).
Chapter 1 - Management of the Birdstrike Risk

1.1 The management of the risk of a birdstrike involves specialist knowledge and specific measures. These measures are aimed at deterring birds from flying on and in the lower flightpaths in the vicinity of the aerodrome and primarily include the use of risk assessment, aerodrome habitat management, bird control procedures and safeguarding. However, the birdstrike risk is not similar across all types of aerodromes and flight operations, and therefore it is essential that the most appropriate measures are identified and adopted to suit the local situation. Effective techniques in risk assessment, bird control, habitat management and safeguarding exist that can reduce the presence of birds on aerodromes and the risk of a birdstrike.

1.2 The basis of all birdstrike risk management policy and action is the planning and the effective use of human resources, procedures and diligence which reflects the principles of safety management that an aerodrome operator is required to apply to aspects of aircraft operations within its responsibility.

1.3 The objective of birdstrike risk management is to implement a birdstrike risk management policy and those measures necessary to reduce the birdstrike risk to the lowest practicable level.

2 Bird Control Management Plan

2.1 The aerodrome operator should develop a Bird Control Management Plan (BCMP) to assess the birdstrike risk, and to define and implement the appropriate bird control measures to reduce or mitigate the risk. The plan should also record the results of birdstrike risk assessments that are conducted and specify the birdstrike risk mitigation measures that are in place. The measures should relate to the threat posed by each identified risk and, due to the relative unpredictability of bird activities, should be responsive to changes as the risk rises or falls. Those measures may include the bird control techniques detailed in this and other related documents.

2.2 For aerodrome operators, the emphasis should be to minimise the presence of flocks of birds on, or in the vicinity of, the aerodrome as much as possible. However, this may be difficult outside the aerodrome boundary. Nevertheless, an awareness of bird attractant activities taking place, such as farmers ploughing fields, and constructive dialogue with the landowner should permit timely and effective action to be carried out.

2.3 A BCMP should, at minimum, include details of:
   a) The roles and responsibilities of aerodrome management and bird control personnel;
   b) The policies and procedures for:
      i) risk identification and assessment;
      ii) on-aerodrome bird control, including when low visibility operations are in place;
      iii) the recording of bird control activities;
      iv) reporting bird control issues;
      v) bird control performance monitoring, measurement and improvement systems;
      vi) personnel training and appraisal;
      vii) recording and analysis of birdstrike reports;
      viii) the logging of bird species and data analysis;
ix) recording the results of birdstrike risk assessments that are conducted;
xi) the periodic assessment and review of the birdstrike risk recording and
information system, bird control procedures and associated activities;
c) details of the birdstrike risk assessments that are conducted and the birdstrike risk
mitigation measures that are in place;
d) the means to ensure that flocks of birds, whether resident or visiting, do not
habituate* on the aerodrome, achieved through the deployment of effective
habitat management and bird dispersal and control measures to reduce bird
activity on the aerodrome; and
e) the activities employed by the aerodrome operator to control or influence areas in
the vicinity of the aerodrome to minimise the attraction to birds, including the:
i) establishment of a safeguarding process with the local planning authority for
consultation on proposed developments that have the potential to be bird
attractant within 13KM of the aerodrome;
ii) means to influence land use and development surrounding the aerodrome so
that the birdstrike risk does not increase and, wherever possible, is reduced;
iii) means to help encourage landowners to adopt bird control measures and
support landowners’ efforts to reduce birdstrike risks; and
iv) procedures to conduct, and record the results of, site monitoring visits.

2.4 The BCMP should be referred to or included in the Aerodrome Manual and made
available to audit by the CAA.
Chapter 2-Roles and Responsibilities

2.1 The roles and responsibilities of all personnel, including those applicable to bird control, are important elements of the aerodrome operator's safety management system and a key contribution to the effectiveness of the BCMP. All personnel should have a thorough understanding of their roles within the plan and be able to collaborate actively with other organisations on and off the aerodrome, such as air traffic control and local landowners. The roles and responsibilities of personnel associated with bird control duties undertaken on a typical aerodrome are described in this chapter. The roles and responsibilities may be adjusted to suit an aerodrome's specific bird control circumstances.

Aerodrome Manager

2.2 Although the aerodrome licence holder has overall accountability for bird control, responsibility for bird control and the implementation of the BCMP at the aerodrome may be delegated, usually to the aerodrome manager or another senior person in the airside operations function. The core responsibilities of such a person, with respect to the BCMP, are to:
   a) assess the birdstrike risk level;
   b) determine policy and produce the BCMP;
   c) provide resources for the implementation of BCMP;
   d) implement the BCMP; and
   e) ensure that the BCMP reference or inclusion in the Aerodrome Manual is correct.

2.3 The aerodrome manager's role should involve tasks that include the:
   a) monitoring and acting on habitat changes on and in the vicinity of the aerodrome and development of appropriate management and control activities;
   b) implementation of habitat management/long grass policy maintenance programmes in accordance with the BCMP, and to introduce modifications to the maintenance programmes as necessary;
   c) analysis and interpretation of log records of bird control activities, birdstrike reports and bird count data;
   d) regular survey of bird concentrations and movements in the local area and liaison with local bird watchers for additional information;
   e) liaison with local landowners on mitigation action;
   f) liaison with local landowners, farmers, environment personnel etc. to obtain intelligence on farming plans, game conservation, etc.;
   g) monitoring of the effectiveness of any mitigation measures in place;
   h) identification of potential birdstrike risks by collating local ornithological and other data;
   i) seeking of advice and assistance from outside specialists on matters requiring expertise not available at the aerodrome; and
   j) production and promulgation of reports on the development of BCMP and on specific topics, safety briefs and birdstrike risk warnings as required.
**Bird Control Co-ordinator**

Whilst a senior manager has overall responsibility for bird control, a technical specialist, such as a bird control co-ordinator, may undertake day-to-day management and efficient implementation of the BMCP. In more detail, this role will involve key duties such as to:

a) advise the aerodrome manager on all matters relating to birds and birdstrike prevention, and to assist with the production and development of the BCMP;

b) plan and organise bird control operations in accordance with the BCMP;

c) supervise and monitor bird control operations to ensure that BCMP is implemented correctly;

d) supervise bird control record keeping (log, bird counts, birdstrike recording and reporting, bird dispersal, culling and habitat management diaries, etc.);

e) provide technical supervision of bird control operators, intelligence gathering, and planning;

f) facilitate the active surveillance, bird dispersal, culling and other field tasks;

g) ensure that all necessary passes and permits are current;

h) ensure the supply, safe keeping and correct maintenance of bird control equipment and consumables; and

i) provide a communications channel between the aerodrome policy makers/providers, bird control operators and other interested parties, such as airline operators and air traffic control.

**Bird Control Operator**

A bird control operator performs the front line role and may be any suitably trained member of aerodrome staff. This role will involve key duties such as to:

a) maintain surveillance of bird activity on the aerodrome and beyond, to the limit of visibility;

b) implement active bird control measures in accordance with the BCMP to counter any detected birdstrike risk;

c) provide the air traffic service, where applicable, with details of a potential birdstrike risk;

d) record bird and bird control activity;

e) record actual, potential or suspected birdstrikes;

f) advise senior personnel on improvements to the bird control task; and

g) assist with surveys, etc.
Chapter 3 - Risk Identification

This chapter describes those significant factors that should be considered in an assessment of the birdstrike risk at an aerodrome.

Assessment of the Birdstrike Risk

In order to manage the risk of a birdstrike, the aerodrome operator should develop a systematic method of obtaining information regarding potential birdstrike risks on and in the vicinity of the aerodrome on a regular basis and:

a) assess those risks, in the context of aircraft operations;
b) analyse bird strike records to identify how many birds have been struck and which species;
c) identify and target those birds more likely to cause damage to aircraft, such as flocking and/or larger species; and
d) develop a structured approach to bird control.

Before any risk assessment can be conducted with any degree of accuracy, the level of ambient birdstrike risk, which is the level and type of bird activity that would occur in the absence of any monitoring or control measures, should be determined. This level provides a measure against which to assess the effectiveness of the plan. Details of existing bird locations and bird movements relative to those locations and the aerodrome will need to be ascertained, both to establish an accurate database and to keep the information flow current. A risk assessment should therefore be conducted initially to provide a quantifiable benchmark and repeated thereafter on a periodic basis such that:

a) each potential birdstrike risk can be assessed in detail;
b) each risk can be quantified in the short and long term, dependent upon bird population and habitat seasonal changes;
c) the potential risks can be assessed on a comparable basis;
d) the continuing risk can be monitored; and
e) control actions can be focused in a structured manner.

A typical risk assessment process may involve:

a) a detailed hazard description, identifying bird species and associated habitats that influence the size and behaviour of bird populations in the area;
b) an assessment of the probability of a birdstrike with a particular species, taking into consideration the current mitigation procedures in place and seasonal factors;
c) consideration of the species involved including size and numbers (e.g. solitary or in flocks), an assessment of the likely severity of the outcome of a birdstrike;
d) an assessment of the frequency of serious multiple birdstrikes;
e) the determination of the acceptability of the level of risk by summing the probability and severity, based on a probability/severity matrix, such as illustrated in the figure 1 below (where the colours red, yellow and green may depict respectively unacceptable, marginal and acceptable risk);
f) the identification of further risk management options available; and
g) the development and implementation of an action plan to eliminate, reduce or
mitigate unacceptable risks.

Aerodrome operators should be able to develop a comprehensive and sustainable
BCMP from the risk assessment process above. However, further review of bird
movements and changes in populations, including the effect of mitigation action, and
the environment is necessary to re-assess the residual risk once the BCMP is in place.
All risk assessments should be reviewed regularly to ensure validity. Birdstrike reports
are useful in assessing whether the risk is changing or increasing. All
stakeholders at an aerodrome should be encouraged to share data on the birdstrikes
occurring on the aerodrome, in the vicinity of the aerodrome or en-route. Analysis of
this information will allow the aerodrome operator to establish a more accurate
assessment of the current risk, which will allow risk reduction methods to be targeted
more effectively.

Information Gathering
Intelligence gathering is an essential component of the birdstrike risk assessment
process and involves the monitoring of all potential bird attractants, concentrations
and movement patterns, both on and in the vicinity of the aerodrome. In addition to
field observations by aerodrome personnel or other specialists who understand the
importance of such monitoring and can apply birdstrike knowledge, in the context of
the location of a potential bird attractant site and the type and numbers of bird species
found there, liaison with local landowners and land users such as local bird watchers
and ornithological societies, nature reserve wardens, environment personnel, farmers
and may yield useful information.

Aerodrome bird control personnel and their colleagues (who either live locally or
commute regularly through the aerodrome's environs) should be encouraged to be
generally aware of bird activity and to pass information on to the appropriate
personnel.

Awareness and understanding of bird concentrations and movements can improve
the efficiency and effectiveness of bird control on the aerodrome and will determine the amount of effort required to manage the risk and the type of control actions. When assessing attractants, a clear understanding is needed of the direct impact each potential bird attractant site and its proximity to the aerodrome is likely to have on the potential birdstrike risk, having identified and taken into account the bird species involved. Surveys should be conducted in the local area in different seasons to identify attractants, concentrations and regular movement patterns. Each potential bird attractant feature or development on the aerodrome and in its vicinity should be assessed. Having identified the potential bird attractants the possible impact should be assessed so that the level of risk presented to flights at the aerodrome can be determined. Such an assessment may include the following factors:

a) location - the proximity to the aerodrome and associated take-off and approach flight paths;
b) the numbers of birds present;
c) the size/species of birds;
d) the site attractiveness - whether it is used as a source of food, a roost or nesting site;
e) the bird flightlines to/from the site - whether flightlines are direct to the aerodrome, across aircraft flightpaths outside the aerodrome boundary, overhead the aerodrome or not across the aerodrome/flightpaths;
f) any control action undertaken by the site operator - actions may range from no action to housekeeping actions only, passive and active bird scaring measures to culling; and
g) daily/seasonal factors - whether the site is a continuous risk (each day and throughout the day), a regular daily risk (once/twice a day), a risk related to specific daily or seasonal activities, or an annual risk.

Typical factors that should be considered when assessing sites are detailed in the following paragraphs.

**Bird Attractant Habitats: On-Aerodrome**

The differing landscapes on the aerodrome may create a variety of attractants that need to be identified and assessed, to determine the appropriate prevention or control actions required. The following paragraphs may also apply to sites in the vicinity of the aerodrome.

**Food**

Birds require high-energy foods and many species depend on earthworms, snails, slugs, spiders, millipedes, and insects (especially larvae) present in grassland and the underlying soil. Cattle Egrets and other bird may occur in large flocks to feed on soil invertebrates on aerodromes. Carnivorous birds may feed on fish and small mammals, such as rodents.

Very few birds eat grass and then, only when it is short and in vigorous growth. Therefore, the grass itself is not a bird attractant but other plants among it can attract large numbers of birds. The leaves, flowers and seeds of weeds, are food for Pigeons, and other small birds. Therefore, consideration should be given to the need to minimise or eliminate such attractants through, for example, the use of herbicides.

Parts of an aerodrome are sometimes let for growing crops. Although tall crops are mostly unattractive to birds, they have the potential to cause a variety of problems immediately adjacent to the movement areas. Activities like ploughing, harrowing and
cropping which disturb the soil, and also sludge spraying, manure spreading, seed drilling, ripe crops, harvesting, and silage cutting create feeding opportunities for Gulls and Pigeons for example. Such activities inevitably attract birds and will increase the resources required for bird control. Having fed, birds such as Gulls and pigeons will rest in the vicinity for many hours. Wastes from in-flight and terminal catering areas, litterbins in car parks and viewing terraces, etc. attract Gulls, pigeons and other Passerines (perching birds).

**Open Terrain**
Flat, open terrain is an inherent characteristic of an aerodrome, which cannot be modified. Expanses of grassland covering large areas between runways, taxiways and aprons and paved surfaces create bird attractions on aerodromes, as do buildings and other installations. The unobstructed view and open space provides security (plus, for flocking species, mutual protection from many pairs of eyes) and affords a warning of potential danger for large flocks. Open terrain attracts all species except those which avoid danger by living in trees or dense cover. However, maintaining the grass sward at an appropriate height can eliminate the open aspect on the grassed areas. The bird attractant aspects of open terrain are relatively simple and well understood, and effective countermeasures are available. The presence of other, less prominent features such as open drainage ditches, ponds, scrub, bushes and trees, earth banks, and waste food also provide more habitats, for larger numbers of birds and additional species, to exploit. Attention should be paid to grass reinstatement in areas after aerodrome works.

**Landscaping**
Landscaping developments include grass, tree and shrub planting and may involve the creation or enhancement of a water feature. Landscaping schemes have the potential to:
- a) create dense vegetation that may become a roost;
- b) provide an abundant food supply in the form of fruits and berries; and
- c) create standing water or watercourses which attract Gulls and water fond bird species.
Generally, in terms of bird attraction, landscaping schemes attract smaller concentrations of birds from a smaller area, have less potential for increasing birdstrike risk than developments such as landfills, sewage treatment plants and wetlands, and have much in common with many natural and semi-natural features commonly found around aerodromes. Landscapes commonly include trees and shrubs, which may provide food and shelter for nesting and roosting.

**Nests and Roosts**
Many birds nest in trees and bushes. Some however, nest colonially in traditional rookeries in small woods and lines of mature trees but recently they have expanded into a wider variety of smaller trees and man-made structures, such as aerodrome lighting gantries and electricity distribution pylons. Buildings and structures with access holes and crevices provide nest sites and roosts. Pigeons roost and nest on ledges on the exteriors of buildings and inside them. Derelict aircraft provide nesting and roosting sites.
Water
Open standing water and watercourses attract Fregate’s for example that are nearly all large birds and may also occur in large flocks. It is usually impossible to evict them with scaring devices. The more open water sites there are on and around an aerodrome, the more complex and frequent will be the movements of those kind of birds between them. There may also be more activity at night than during the day. Wet and waterlogged grass also attracts certain birds (especially at night) and drainage should be installed or improved, wherever possible. Flooding flushes soil invertebrates to the surface making them very accessible to birds, attracting, Gulls for example. Larger, permanent waters, such as ponds, balancing reservoirs, the sea etc., attract Fregates and Gulls for example.

Bird Attractant Habitats: Off-Aerodrome
Birds can travel long distances relatively quickly; therefore an environment that does not meet all their requirements can be exchanged for one that does. Birds can establish nesting colonies or overnight roosts at sites remote from disturbance and commute to distant feeding grounds. If feeding sites are widely distributed and numerous (e.g. ploughed fields), daily dispersion may be diffuse or unpredictable, with the overnight roost the only constant feature. Flying from one site to another may establish bird flightlines that traverse an aerodrome or low level aircraft arrival or departure routes. The aerodrome itself may be the birds’ destination. A food supply that is concentrated and abundant at only a few sites causes fixed dispersal patterns and more predictable dawn and dusk flightlines. Overnight roosts for birds such as Gulls, tend to be very stable as well as providing shelter and security. Species that depend on abundant food supplies tend to roost in larger aggregations, and it is thought that the roost assembly provides a mechanism for the transmission of information on the location of food. Awareness and understanding of bird concentrations and movements can improve the efficiency of bird control on the aerodrome. For example, if the dusk return passage of Gulls over the aerodrome to a roost is understood, aerodrome bird control personnel may be able to warn air traffic control at the appropriate time. Similar precautions may be taken for dawn and dusk movements as it may also be possible to locate the roost site and disperse the birds to another roosting site.

The Coast
Sandy and muddy shores, especially around estuaries, support very large numbers of Gulls, and Fregates. Generally, coastal aerodromes have larger numbers of birds of more species, whose activity patterns are complicated by tide state and more affected by the weather, than at inland aerodromes.

Landfills for Food Wastes
Wastes from household and commercial premises contain a high proportion of waste food which, in a landfill site, supports very large numbers of Gulls and Cattle Egrets. Most wastes containing food are disposed of by controlled landfilling in which they are compacted into layers around 2 m in depth and covered daily with inert material. This does not limit access by Gulls or Egrets, which feed as the wastes are tipped, spread and compacted. Gulls and Egrets congregating at landfills could contribute to the birdstrike risk to nearby aerodromes in several ways:

a) when not feeding, they spend most of the day on open sites within 6 km (4 miles) or more from the landfill;
b) they commonly soar up to 450 m (1500 ft) or more in clear weather; and
c) they may commute between the landfill and their roost, which may involve
crossing an aerodrome or its approach and departure routes.

**Sewage Treatment and Disposal**
Modern sewage treatment plants, unlike their predecessors, do not attract large
counts, birds may
visit them in relatively modest numbers. Percolating filter beds however, may serve as
breeding grounds certain bird species.
The effluent from obsolescent or overloaded plants at some estuarine and coastal
sites may contain sufficient organic solids to attract large flocks of Gulls or other species
to the outfalls. Where discharge is not continuous, but at certain times or tide states,
those species learn the pattern and congregate at the appropriate times.

**Reservoirs, Lakes and Ponds**
Populations of birds with specialised aquatic habits are concentrated on and around
freshwater bodies that may be relatively widely separated in the landscape. In
addition, large water supply reservoirs, canal feeder reservoirs,
and other large lakes may be used as regular overnight roosts by certain species.

**Sand, Gravel and Clay Pits**
Mineral extraction does not itself attract birds. However, the large voids created
sometimes fill with water either during working (wet extraction) or, when they are
worked out, are allowed to flood and restored as amenity lakes or nature reserves.
Sand, gravel and clay pits can sometimes be filled in with water, or their shape can
be modified during or after excavation to break up the expanse of open water. Narrow
causeways, piers and islands are usually insufficient and may increase the
attractiveness to birds by providing inaccessible dry land roosting sites. Increasing the
extent of shoreline by creating promontories, bays and islands increases the
attraction also. Active scaring around dusk may remove a roost if it
were to occur.

**Agricultural Attractants**
Growing and harvesting crops inevitably attracts birds at some stage. However, the
attraction usually arises suddenly and persists for only hours or a few days. The
contribution of agricultural activities to the birdstrike risk is mainly confined to local
farms.
Livestock can also attract birds. Free-range pig farming, for example, is comparable
with a landfill in that the attraction continues for as long as the field is in use. Grazing
cattle, keep grass short and maintain suitable feeding conditions for certain bird species.
Their droppings are breeding habitats for insects whose adults and larvae are also
sought by birds.
Chapter 4- Risk Reduction

This chapter describes typical birdstrike risk reduction and bird control measures that may be employed to reduce the risk of a birdstrike.

The aerodrome should be made unattractive for birds by the adoption of all, or a combination of, habitat management and surveillance/dispersal strategies, depending upon the assessed birdstrike risk. These measures are normally within the control of the aerodrome operator; however, bird concentrations near an aerodrome and within its associated airspace may be much more difficult to manage directly, are not easy to influence or are inaccessible to aerodrome bird control personnel. However, local authorities and landowners may co-operate in helping to reduce the birdstrike risk by allowing access and control action or, even, taking action themselves when a bird attractant site has been identified and the risks pointed out. Therefore, beyond the aerodrome boundary the control of bird species and populations is normally based on safeguarding and other methods that involve dialogue and cooperation with planners, developers and landowners. In particular, priority should be given to establishing contact with local landowners, developing working relationships with them and encouraging them to adopt measures to reduce the attractiveness of the site to birds or to mitigate the risk, especially in the immediate approach and departure areas.

For example, it may be possible to influence the timing of some farming activities to suit aerodrome operations or where seasonal ploughing (South East Monsoon) by local farmers may cause a temporary increase in risk, liaison with the landowner could result in prior warning of the ploughing and allow time to apply the appropriate mitigation. Aerodrome personnel employed to carry out bird control activities should be familiar with and competent to deploy the methods used.

Habitat Management
Birds visit places that provide habitats which offer food and/or security for foraging, resting and, sometimes, breeding, depending on the species. Birds will visit for as long as the attractions remain, with fluctuations in numbers and persistence dictated by factors such as migration, weather, breeding success and the effectiveness of the control activities. Not all birds are attracted by the same habitats and in the same circumstances; therefore, habitat management techniques should be aimed at the removal or reduction of these habitats according to the type of birds that are targeted. If the attractants can be identified and eliminated, or minimised, influxes of birds will be similarly reduced. In addition to reducing the attractiveness of the site, it is also important to avoid creating new habitats. The potential habitat provided by a new development may not be obvious or established immediately.

Food
The attraction of fruitbearing plants may be reduced by:
 a) eliminating the most attractive species
 b) reducing the number, distribution and proportion of the plants;
 c) using varieties which do not produce fruits or, for some, male plants only. Where hedges which bear berries are present, they should be trimmed to limit berry production.
 Bins and skips should be of designs that exclude birds (e.g. with drop down or swinging lids) and should be emptied before they overflow.
Roosts
The complete destruction of any plantation is the only immediate and permanent means of removing a roost. However, the attractiveness of a potential roosting site may be reduced by lower planting density (e.g. to 4 m centres or lower), leaving open 'rides' (open lines of trees and shrubs), and thinning out early to ensure the site remains open. This in some cases is not compatible with a screening function, but staggered planting in rows may help.
Dilapidated buildings should be proofed and repaired to prevent access by roosting and nesting birds. Wherever possible, new buildings should be designed:
a) to deny access to the interior and roof spaces;
b) with self-closing doors or with plastic strip curtains or other mechanisms to prevent access by birds;
c) without flat roofs; and
d) with minimal roof overhangs and without ledges beneath overhangs and external protrusions.
All areas of rooftops should be easily accessible to enable action against nesting. One must also be aware that certain species will also use steeply sloping roofs where the nests can be lodged behind vents, skylights, etc.
Derelict aircraft should be removed or otherwise rendered inaccessible.
Specialist advice should be sought before taking action against pigeons, breeding Gulls and any birds inhabiting buildings.

Water
Watercourses and drainage ditches provide cover and food. Wherever possible, watercourses on the aerodrome should be culverted underground. Where culverting is not possible, effective bird exclusion or control systems such as netting exclosures extending to the aerodrome perimeter should be deployed as necessary to protect new developments and existing water bodies and watercourses. Channels should be maintained free of bank side and emergent vegetation to minimise flooding and damage to nets.
Netting exclosures are the most efficient approach but are practical only for smaller ponds and watercourses. However, an exclosure also removes the need for any other control measures or habitat modification. A less reliable form of exclosure is to 'cover' the open water with reed beds, but there are practical problems with establishing and maintaining the vegetation and there exists the possibility of a roost forming.
Drainage of wet and waterlogged grass should be installed, or the site regraded to eliminate hollows that hold standing water.
Appropriate measures should be taken to prevent access to emergency water supply tanks and oil separators on aerodromes.
If large permanent water cannot be eliminated and the water area is sufficiently small, it should be netted over. Wires suspended above the water surface cannot be relied on to exclude birds. A less reliable means of denying bird access to open water is to plant reed beds over the entire area; however, specialist advice should be sought as reeds cannot tolerate major fluctuations in water level and it may be difficult to accommodate seasonal rainfall.
The following habitat controls can also reduce the attractiveness of the water to birds:
a) the water should be as deep as possible (over 4 m) to minimise bottom growing vegetation;
b) the shape should be as simple as possible (circular or square), with no islands or promontories, to reduce the length of shoreline and reduce nesting sites.
c) banks should be as steep as possible (preferably vertical), with minimal vegetation; to prevent birds from walking in and out of the water;
d) there should be a vertical lip or fence to prevent birds from walking in and out of the water;
e) on smaller lakes, wires suspended above the surface may deter birds that require long take-off and landing runs. The wires should be made visible with tags, to reduce the risk of birds colliding with them and sustaining injury;
f) dense vegetation, which provides nesting cover, and short grass, which is grazed by certain species, should be avoided. The water should be surrounded with long grass or a sterile substrate; and
g) the water should not be stocked with fish.
All water features, including those with bird exclusion systems, should wherever possible be sited so that the bird movements they create do not conflict with aircraft, taking into account their locations relative to both aircraft flightpaths and other water bodies in the aerodrome vicinity.

**Landfills and Sewage Treatment and Disposal Sites**
A netting exclosure is inherently the most effective and reliable system to control birds at a landfill site and at sewage treatment and disposal sites with open tanks, and its operation is easier to monitor. Netting may not, however, be effective against all birds, and an active bird control programme should be provided as a back-up. When active bird control is provided, the necessary levels of vigilance and dispersal action need to be sustained to achieve an effective level of deterrence.

**Aerodrome Grass Management**
The most effective habitat control measure that can be applied on an aerodrome is the management of the grassed areas. Short grass provides security by enabling smaller birds to see over the wider spaces of the aerodrome for early warning of approaching dangers. It also increases populations of invertebrate animals on which many bird species rely for food. Short grass therefore does not deter most species of aerodrome birds and should be avoided. Conversely, longer grass (typically above 400 mm) that falls over because it cannot support itself also has the potential to attract birds. Grass maintained at a height of 150 to 200 mm (6" to 8") makes it more difficult for birds to locate prey at or below the surface, spoils the security effect, and reduces populations of soil invertebrate food sources. If maintained at this height, bird numbers on the aerodrome can be reduced significantly. This method of grass management is often referred to as a long grass policy.
All grass areas within the aerodrome boundary, including the margins adjacent to runways and taxiways should be included in the grass maintenance scheme. As grass growth vary according to season, so does the presence of certain bird species; therefore, grass maintenance should be planned accordingly to deter the targeted birds when necessary.
Various types of grass maintenance schemes exist, such as the long grass policy and silaging, and each has its own advantages and disadvantages for aviation use. The licence holder should employ the scheme most appropriate to the aerodrome. The risk assessment should be revisited to identify any additional measures that may be necessary to complement the scheme. For example, a long grass policy should be complemented by dispersal methods to deter other birds that may frequent the aerodrome.
Before a long grass policy is first established, and periodically thereafter, it may be prudent to have soil analyses carried out and any nutrient deficiency made good.
When seeking advice from agronomists, who commonly advise farmers on grass crops and pasture and may be unfamiliar with the unique requirements for aerodrome long grass, the need for sustained strong growth of appropriate grass species, rather than a flush of rapid lush grass, should be stressed. General-purpose fertiliser in slow acting granular form, rather than a high nitrogen formulation, is appropriate. In almost all cases, good stands of long grass can be obtained by allowing the existing sward to grow taller. Re-seeding is rarely necessary.

Long grass regimes are usually effective only when the aerodrome bird control organisation is involved in planning, monitoring and regulating the maintenance programme.

Long grass maintenance requires activity throughout the year. Several dates are given in the paragraphs below but aerodrome operators should take account of local climatic conditions when planning their maintenance regime.

In some areas, animal (eg) rabbits may be a particular problem. Large populations of rabbits can for example make it impossible to grow effective long grass, and the rabbit population may need to be controlled accordingly.

**Example Long Grass Policy Maintenance Regime**

As soon as the ground will permit without compacting and rutting, dead growth and the accumulated clippings from past topping cuts should be removed. This operation is called "bottoming-out". If not done, decaying material ("thatch") would exclude light and air, suppressing growth and weakening or even killing the grass, and encouraging pests and disease. Bottoming-out also encourages the grass to flower. Delayed flowering produces fewer and smaller flowers, and hence fewer woody stems to hold the subsequent leafy growth erect.

Bottoming-out involves two processes: cutting the grass uniformly to within 50 mm of the ground; and removing the freshly cut grass together with the accumulated thatch. Typical equipment available for bottoming-out is a flail-type forage harvester and a forage harvester, which has rotating discs or drums with cutting blades. The equipment should dislodge and lift the accumulated thatch for removal directly into an accompanying trailer, thus avoiding a separate operation to collect the loose material, which is a potential foreign object debris (FOD) issue.

Depending on local climate, soil type and grass species, bottoming-out is usually required every 1 to 3 years. Specific areas of the aerodrome may be bottomed-out at a particular time of the year on a 2 or 3 year rotation basis.

If thatch build-up has been heavy, it may be necessary to harrow, rake and clear again immediately after cutting and clearing and, possibly, to repeat the operation. Similarly, if the ground is uneven, rolling with a heavy roller may be needed.

Herbicide, if required, should be applied at the appropriate time of the year to guarantee effectiveness. Even moderate weed infestation that does not seriously harm grass should not be tolerated as it may attract birds such as Pigeons. However, Pigeons only visit the grassed areas of aerodromes to feed on weeds, which can be removed by the application of appropriate selective herbicides before the weeds set seed.

The first topping cut should be taken when the majority of grasses have produced flowering heads. The majority of grasses in aerodrome swards produce flowering stems taller than 200 mm; therefore, it will probably be necessary to allow initially the grass to grow to that height or slightly taller. Topping cuts are taken thereafter with a rotary mower set to give a cut between 150 and 200 mm in height. Topping cuts are usually required throughout the growing season. Depending on the thickness of the sward, the grass should not be cut too much in one cut, or the
clippings will lie on the surface, exclude light and air, and prevent the grass beneath from growing.

After growth ceases, no further maintenance should be necessary. The accumulation of clippings from topping cuts during the growing season and die-back of the grass will create a build-up of thatch which will need to be removed at the start of the maintenance cycle (see figure 2 below).

**Figure 2**

**Optimising a Standard Long Grass Policy Maintenance Regime**

The standard long grass policy maintenance regime is devised to maintain aerodrome grass in a way that is less attractive to birds than traditional gang mowing. It is biased towards non-interference with aerodrome operations, rather than bird repellence.

However, the best and most cost effective bird deterrent swards will be achieved where expertise and control is exercised to fine tune maintenance procedures in a manner more sensitive and reactive to local conditions, including:

a) the need for bottoming out every year if thatch build-up is minimal;  
b) the frequency of topping cuts as the growing season progresses; and  
c) delaying the first topping cut if young birds are present in the grass.

Introducing a flexible maintenance regime requires expertise to monitor and react to grass condition over a short time scale, which may require the availability of funds for maintenance operations to be carried out at short notice as the need arises.

**Potential Effect of Grass Height on Navigational and Visual Aids**
The height of the grass in certain areas on the aerodrome may affect the performance of aeronautical navigational and visual aids, especially the instrument landing system (ILS). In damp or wet conditions the radiated signal as received by an aircraft or the signal received by the ILS field monitors may be distorted, affecting both the integrity and continuity of service of the system. The effect of grass on the ILS signal depends on the:

a) type of grass (broad or narrow leaf);

b) height of the grass and density of growth;

c) water content within, or water from dew or rain on, the leaves; and


d) height and type of aerials (transmitting and monitor).

The ILS glidepath is probably affected more than the localiser and 100 mm (4") is considered to be the maximum permissible grass height from the glidepath aerial to approximately 5 m beyond the monitors. A grass height of 200 mm (8") could be tolerated beyond this point up to the limit of the glidepath critical area; however, for simplicity it may be preferable to limit the grass height to 100 mm across the whole area. For the localiser, a maximum height of 200 mm (8") should be acceptable. However, sideband reference systems, with reduced height aerials, may need special consideration and 50 mm (2") may be all that can be tolerated in the immediate foreground of those systems with pairs of aperture monitors or with their aerials close to the ground.

The height of the grass should not obstruct the display of an aeronautical ground light, sign or other type of visual aid.

Aerodrome operators are advised to consult the relevant technical organisation on the issues above.

**Bird Dispersal on an Aerodrome**

3.1 Whilst aerodrome habitat management is an important measure to reduce the birdstrike risk, effective control measures should also be included in the bird control management plan. The following paragraphs identify those methods commonly used to control bird populations.

**Scaring**

Birds appreciate the potential danger of predators and take positive action to avoid them. Other birds or mammals prey upon most birds; therefore, predators (and, possibly, scarers that mimic predators in some way) have a more sustained aversive effect than other devices. Bird scaring relies on persuading birds of the presence of such danger.

One of the key elements of effective scaring is to avoid habituation. Any scaring system used needs to be effective over large areas and not ignored by the birds after a limited period. Accordingly, the scaring stimulus should be taken to the target birds and used only when it is required.

Several types of bird scaring devices and techniques exist, some of which are examined in the following paragraphs. Birds react strongly to signals from other birds that indicate danger, distress (when captured by a predator) or death, and habituation does not readily occur. Some birds, typically social species that communicate with each other vocally, emit piercing repeated distress calls when captured by a predator. Young birds emit distress calls more readily than adults.

The use of recorded distress calls (bio-acoustics) is considered the most efficient and cost effective method for dispersing birds from aerodromes. However, although a distress call is a warning of potential danger, it is not a scaring device in the conventional sense in that the bird's response is not to depart immediately and
quickly. In addition, this method is species-specific and may cause the birds to react defensively rather than disperse. For instance, on hearing a distress call birds may become alert and take flight; approach the sound source and circle overhead or nearby, often emitting alarm calls; dive threateningly at a predator; or just disperse to a less risky location. This inconsistent and unpredictable behaviour pattern demonstrates that a distress call should only be used when no aircraft are operating locally. It may take 10 minutes or more for birds to depart the aerodrome and there is no control over direction of dispersal; therefore, distress calls should only be used to deter birds when there is ample time between aircraft movements, or at the start of the day.

Alarm calls are produced by some species when they sight a predator. The function of alarm calls is to alert other birds to potential danger but, beyond that, any further reaction may depend on the actions of the predator. Thus, alarm calls are not normally used to disperse birds from aerodromes.

It is almost always impractical to use dispersal measures to exclude Water-bourne birds from water. They feel secure on the water and, if threatened, tend to remain there. When any bird scaring technique or dispersal method is used, the behaviour of the birds in relation to aircraft movements has to be taken into consideration and care must be taken not to increase the risk of a birdstrike as a consequence.

**Dispersal by Distress Signals**

Birds respond best to distress calls of their own species. They also react well to those of closely related species, but may ignore others. It is therefore important to identify the target birds before attempting to disperse them. With mixed flocks, it may be necessary to broadcast several species' calls in sequence to disperse all the birds. Flocks react similarly to recorded distress calls played back in the field by taking flight and approaching the source of the call to investigate. However, in this instance, only the audible stimulus is presented; therefore, if the broadcast is continued the birds will probably continue to fly to and fro for many minutes. When the broadcast is terminated the likely reaction is to gain height and depart, or to resort to trees where they are safe. The inability of birds to locate and identify a predator to assess the continuing threat is probably the most important element in causing them to disperse and seek a place that is less of a threat from predators. Birds have individual variations of temperament in the same way as humans. Not all are equally sensitive to distress call broadcasts and very small flocks may not respond, possibly because they do not contain the one or two key nervous individuals that cause the remainder to follow suit.

Distress calls are commonly recorded on magnetic media or in digital software form. The recording should be clear, with no distortion or significant background noise. If the birds cannot hear the calls properly, they cannot be expected to react appropriately. For each species, the sequence of distress calls should last for at least 10 seconds before repeating, with gaps no greater than 2 seconds in the sequence. The distress call would typically be broadcast from a vehicle, using horn loudspeakers that have a directional beam. The loudspeakers should be mounted, facing forwards, at the front of the vehicle roof to minimise the chances of ground undulations masking the calls. The loudspeakers should be angled slightly downwards (around 2°) so that the centre of the cone of sound is aimed at birds on the ground about 100 m ahead, and to ensure that rainwater drains from the horn. Multiple loudspeakers should be set as far apart as possible or angled outwards slightly (about 15°). The amplifier should have sufficient power (typically 15-20 Watts) to cover the bird control area. The vehicle should be positioned at about 100 m from the target flock. A closer approach may disturb the birds before the broadcast commences; and at longer ranges the calls may not be heard properly, especially if there is background noise.
from aircraft. The vehicle should be upwind and stationary, to allow the birds to approach and investigate the calls. Driving at speed along the runway with distress calls playing gives no opportunity for the 'approach and investigate' behaviour as by the time birds have taken flight, the stimulus has gone and they re-alight. In this way, the birds have frequent opportunities to hear distress calls (briefly) and habituation will develop as they learn that there are no harmful consequences.

The target birds should be identified and the appropriate distress call recording selected. If several species are present, the recordings of the most numerous species should be played first. The birds should become airborne within 20 seconds of hearing the distress calls and approach the speaker. Briefly waving a cloth gives an additional visual stimulus and usually causes the birds to take flight immediately. The cloth should be displayed very briefly: birds have keen eyesight and they will not be fooled for long. Ideally the cloth should resemble a struggling victim.

Once airborne, the flock will need sufficient time to approach and investigate the source of the calls before the broadcast is terminated. A broadcast should be of about 90 seconds duration. Species that do not have distress calls will sometimes follow the lead of those that do.

Certain species often take flight and fly around in wide circles at some distance, without approaching, in which case it may be necessary to edge forward and turn the vehicle to keep the flock in the sound beam. Flocks may comprise mostly or entirely of juveniles, and react poorly to distress calls.
Other species fly directly away and it may be necessary to follow them slowly to prevent them from re-alighting. Local birds, after repeated exposure to distress calls, may eventually omit the approach phase of the response and depart immediately on hearing the calls or, even, at the approach of the familiar vehicle. It may be necessary to follow to ensure that they depart the aerodrome.

High volume settings may attract birds onto the aerodrome, making the situation worse. It is good practice to start the broadcast at a low volume and increase it until the target birds start to respond.

Dispersal by a Pyrotechnic Bird Scaring Cartridge (BSC)
Use of a BSC is a common means of dispersing birds at aerodromes. Also commonly known as a 'shell cracker' or 'cracker shell', a BSC is, in its most typical form, a 12 bore shotgun cartridge case with the shot replaced by a projectile containing an explosive charge and delay fuse/light trace, so that the projectile detonates at some distance from the gun. The response is usually an immediate departure away from the detonation so some directional control is possible over birds in flight, and the scaring effect can be projected into areas beyond the firer's reach.
Several types of BSC are available. Generally, for use on an aerodrome, the BSC should:
a) have a range greater than 80 m when fired at a 45° elevation (i.e. a flight time of 4 to 5 seconds before detonation) to allow firing from outside the runway strip and to provide a reasonably effective area;
b) detonate between maximum and ½ maximum height when fired at a 45° elevation;
c) produce a loud, sharp 'crack', with a bright flash; and
d) not be a potential fire risk.

A trace may enhance the effect of the BSC, especially when used to move a flock in a desired direction, and illustrates the projectile's trajectory, especially when it is deflected by the wind. The trace should be visible in sunlight throughout its flight. The pistol should be fit for purpose; have a safety catch; and be pressure tested for the type of BSC used. Pistols and BSCs should be transported in appropriate carrying cases and stored in a secure and safe location when not in use.

The BSC is the only device commonly available to the bird controller that, within the limits imposed by its range, is more rapidly mobile than the birds. Thus, it enables the direction of movement of target flocks to be controlled. By positioning themselves and aiming the pistol appropriately, a bird controller can place the detonations behind the birds to hasten their departure, and to either side to keep them on track and to hold the flock together. A BSC fired high in the path of an approaching flock will cause it to pause and orbit, even if it cannot be deflected altogether. However, birds will avoid a significant headwind. No matter how far they are pursued or how many BSCs are placed behind and to either side of them, they will eventually turn back. Directional control of the birds is aided if the BSC has a bright "tracer" component and adequate range.

In many circumstances, it may not be permissible to fire a BSC beyond the aerodrome perimeter but, by firing vertically, its effect can be extended outwards over a considerable distance, including locations such as in the approach path. It is generally much easier to persuade one large flock to leave the aerodrome than several smaller ones. Firing directly into a flock will probably fragment it and the birds may not re-group. This should therefore be avoided, unless the birds have ignored previous dispersal attempts and it is intended to increase the stress level, i.e. to achieve an effect similar to shooting. A very close detonation may be useful to disperse birds that re-group quickly.

If birds linger in flight over the aerodrome after a distress broadcast is terminated, BSCs may be used to hasten departure. However, a bird's behaviour on hearing distress calls is quite different from that of fleeing from a BSC; therefore, a BSC should not be fired during a distress call broadcast.

BSC operators should be competent in their use, comply with relevant firearm and munitions legislation, and be provided with appropriate personal protection equipment (PPE).

Manual Dispersal Techniques

Most birds are very distrustful of man, especially those that are commonly shot as pests (e.g. Pigeons) and traditional quarry species. Indeed, the almost total absence of man on foot (and, therefore, recognisable to birds) may be a major factor in making an aerodrome so attractive to birds, despite the noise and risk levels. Birds that do not react to being passed over by the wings of a taxiing aircraft or, even, the bird control vehicle drawing to a halt nearby, will normally immediately become alarmed when a person alights. Even though they do not react by flying up en masse, they will commonly depart, perhaps in small groups, over the course of several minutes, if the person remains visible. Man is a very effective bird scarer, especially in combination with other dispersal
techniques, and human-operated bird scaring devices are more effective than 'free-standing' methods.

Birds may recognise Raptors that hunt them by features of their wing beats. A particularly effective scaring technique that a person may adopt is slowly raising and lowering the outstretched arms, which may be interpreted by the target birds as the wing beats of a large raptor. The person should be silhouetted against the sky, or a plain background, and facing the target birds. The extended arms should be slowly (about 26-30 beats/min - one beat per two seconds) raised and lowered through a relatively small angle about the horizontal. Flapping the arms rapidly, with exaggerated bending at the elbow and wrist, does not work. Almost all species will react immediately by flying up and directly away. Birds to one side will not react, though birds behind may do so.

Arm scares may not cause birds to move very far, but departure is predictably directly away from the person. They are effective against all common species, can be used at short notice, where noise or pyrotechnics are unacceptable because of proximity to people or livestock, or because of fire risk, and have no cost.

Repellents and Passive Deterrents

Repellents and passive bird deterrents rely on aversive stimuli that act through the senses of touch, smell and taste. Tactile repellents effective against birds include; sticky gels and filaments, used against roosting and nesting birds on ledges and beams on buildings, and lines strung over restricted sites, such as marshy areas. All injurious and lethal substances are now unacceptable and illegal. Birds have limited chemical senses and generally can only detect aversive agents when taken into the mouth on food.

Birds on aerodromes mostly feed on soil invertebrates or on vegetation. However, invertebrates are generally inaccessible for treatment with a repellent and the areas of vegetation to be treated with chemicals are very large and repeated application would be needed. Moreover, unless research with new non-toxic repellents provides a future viable option, cost and environmental aspects would normally rule out such measures.

Other Methods and Techniques

Other techniques include the use of Birds of prey, animals (dogs), unfamiliar objects and startling actions (such as brightly coloured windmills), and scarers that mimic predators such as scarecrows.

A number of other measures have been used with varying degrees of success, including:
a) flags made from fertiliser bags;
b) brightly painted oil drums;
c) windmills and rotating spinners, sometimes accompanied by painted representations of beating wings, or gongs;
d) plastic tape that vibrates and hums in the wind;
e) reflective balls;
f) magnetic field generators;
g) "ultraviolet" bird scarers; and
h) weighted bird balls on water.

Bird scaring techniques using visible lasers are being developed. Although claims are made of their effectiveness, the use of lasers on an aerodrome is subject to requirements specified in ICAO Annex 14 Volume 1. Aerodrome operators considering the use of lasers for bird control purposes shall consult the SCAA prior to their operational use.

All the above scarers should be evaluated for their effectiveness and used accordingly. Some may cease to be effective after a short time because of habituation.

Lethal Methods
There are several reasons for resorting to lethal control methods:

a) to reduce overall numbers and thus to decrease the problem;
b) for the deterrent effect it has on the surviving birds and to enhance the effect of other control techniques; and
c) to remove individual birds which do not depart in response to scaring action, either because of sickness or disability, or because of aberrant behaviour.

If there is no other satisfactory course of action for preserving air safety, shooting birds is an effective means of control, subject to specified conditions. Trapping requires specialist knowledge and expertise.

During the breeding season, local birds are vulnerable and accessible to lethal control methods because they must return regularly to nest sites, and it is normally only necessary to kill one member of a pair. Thus, the population may be reduced and production of replacements prevented. However, the shooting of the most populous birds, with the intention of reducing numbers, is not usually effective, even on a temporary basis. For some species, established breeders can only be removed by shooting. Removing eggs though less effective as some species will nest again also has certain effect. However, it may be possible to reduce numbers by taking action to prevent eggs hatching, by either pricking or oiling the eggs. The aim of this is to make the adult birds believe that the eggs will hatch and thus they will remain with the nest. When it is time for the eggs to hatch it is usually too late in the breeding cycle for the adult pair to produce new eggs.

Most shooting is carried out on an aerodrome as a last resort against intractable flocks to deal with an immediate problem, but shooting can also be integrated into a control strategy to reinforce scaring action. If scaring is followed by an actual stressful event such as shooting, birds learn to avoid the scarer more strongly. The effect may be sustained even if shooting is only occasionally added because the birds may simply react to the scaring signal alone and depart quickly.

Non-lethal control methods are limited and only partially successful on Pigeons and it may be prudent to reinforce them with live shooting on aerodromes where Pigeons are numerous. Wood pigeons, especially, are commonly shot in fields to protect crops and, thus, are particularly responsive to shooting. However, this is only a partial and short-term substitute for control of the birds' food supply.

Successful trapping may require special skills and experience and the law may limit some actions; therefore, specialist advice should be sought before traps are introduced onto an aerodrome.

Many species of birds, nests and their eggs, are protected under law through the provisions of the Environment protection law applicable in Seychelles (as amended).
Aerodrome licence holders and operators, shall ensure that all appropriate personnel engaged in aerodrome bird control and dispersal activities are aware of and conversant with the legislation for their geographical location, to ensure that all bird control activities (both on-aerodrome and in the vicinity) are conducted within the law.

**Safeguarding**

Safeguarding is the means by which an aerodrome operator assesses the impact that a proposed or existing development may have on the safety of flight operations on, or in the vicinity of, the aerodrome. The aerodrome operator may be made aware of proposed developments and other planning applications. Although safeguarding primarily addresses the potential infringement of flight safety surfaces, the potential for the proposed development to become a bird attractant site and increase the birdstrike risk may also be addressed.

Virtually all land types and land uses (including natural habitats) attract birds in some way. Safeguarding should address developments that, individually or as part of a cumulative process, could become bird-attractants with the potential to increase the birdstrike risk at a nearby aerodrome.

Planning decisions in the Seychelles are the responsibility of the government. Aviation interests, and hence the SCAA and the aerodrome operator, have no specific power to override a planning decision. However, the aerodrome operator may offer advice to the planning authority such that aviation safety or their commercial interests may be taken into consideration.

A safeguarding consultation process should exist as part of the planning permission process to address proposed developments with the potential to affect the safety of aircraft operations at civil aerodromes. The consultation process should include a means to address potential bird attractant developments within a 13 km radius circle of the aerodrome. Safeguarding maps should be used to define the 13 km radius circle and subsequently lodged with the planning authorities.

The 13 km circle is based on a statistic that 99% of birdstrikes occur below a height 2000 ft, and that an aircraft on a normal approach would descend into this circle at approximately this distance from the runway.

All licensed aerodromes should establish their own safeguarding consultation procedures with their local planning authorities.

The following factors should be taken into consideration when assessing the potential increase in risk:

- a) the numbers, including seasonal variations, and types of birds that may be attracted to the development;
- b) any proposed landscaping or habitat designs;
- c) the distance from the aerodrome;
- d) the location of the development relative to aircraft arrival and departure flightpaths and within the visual circuit; and
- e) bird movements in relation to the aerodrome; Creating new bodies of water may cause more movements and the increase of birdstrike risk.

Ideally, informal discussions on a potential bird attractant development should take place between applicants and aerodrome operator before the submission of a planning application. This may make it easier to achieve a mutually acceptable outcome with regard to birdstrike risk management.

Where an assessment shows that the birdstrike risk may increase or could increase under certain conditions in the future, and the aerodrome licence holder and developer are unable to agree a solution, an aerodrome operator could object to the planning.
application on safety grounds. Aerodrome operators may use local knowledge of bird populations and activities or an appropriate precedent of a similar safeguarding case to support the objection. The aerodrome operator may request that the objection cannot be withdrawn until measures to ensure there will be no increase in risk are implemented. It may be possible to modify a development (e.g. exclusion of food wastes from a new landfill) or impose planning conditions that require specific action to exclude birds or reduce their numbers (e.g. an effective BCMP). The BCMP should identify the aerodrome personnel holding responsibility for the assessment of a proposed development with the potential to attract birds.

After planning permission has been granted, the aerodrome operator should monitor the development for compliance with any planning conditions that are imposed and report any alleged breach or non-compliance to the appropriate authority.

Many nature reserves are created to protect particular floras or invertebrate communities, which do not represent a potential to increase the birdstrike risk; however, others, such as estuaries, may be major bird sites. It is essential that the aerodrome operator establishes contact and works closely with agencies charged with the management of sites.

**Chapter 5- Birdstrike Reporting**

The commander of an aircraft is required to make a report to the SCAA of any birdstrike occurrence that occurs whilst the aircraft is in flight within Seychelles airspace.

**Definitions**

An industry-wide definition of what constitutes a confirmed, unconfirmed (bird/wildlife strike) or near-miss occurrence has not previously existed. Many aerodrome operators have therefore established their own set of definitions in order to facilitate a consistency of reporting and measurement of on-aerodrome birdstrikes, which are often used to measure key safety performance indicators, as part of their aerodrome SMS.

In order to assist aerodromes, and to aid standardisation and consistency, the SCAA, has adopted a set of definitions. These give guidance for the determination of confirmed and unconfirmed birdstrike occurrences (shown in Tables 1 and 2). The definitions shown in Table 1 are based on the best practice standards produced by the International Birdstrike Committee (IBSC) and those adopted by the International Federation of Airline Pilots Association (IFALPA).
Table 1  Birdstrike Definitions – Type of Strike

<table>
<thead>
<tr>
<th>A. Confirmed Strike</th>
<th>B. Unconfirmed Strike</th>
<th>C. Significant Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any reported collision between a bird/wildlife and an aircraft for which evidence in the form of a carcass, or other remains are found on the ground; or damage and/or other evidence is found on the aircraft.</td>
<td>Any reported collision between a bird/wildlife and an aircraft for which no physical evidence is found (i.e. no damage to the aircraft is evident upon inspection, and no bird remains, carcass or blood smears are evident on the airframe).</td>
<td>Incidents where the presence of birds/wildlife in the air or on the ground, resulted in an effect on a flight but where no physical evidence of an actual birdstrike exists. This includes near-miss occurrences, rejected take-off and go-arounds.</td>
</tr>
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Bird/wildlife remains or complete carcass found on an aerodrome where there is no other obvious cause of death should be treated as a confirmed strike and reported as such accordingly.

Table 2  Birdstrike Locations

<table>
<thead>
<tr>
<th>D. On-Aerodrome Birdstrike</th>
<th>E. Aerodrome Vicinity Birdstrike</th>
<th>F. En-route Birdstrike</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any birdstrike occurrence reported by the commander of an aircraft, where the aircraft is believed to be at a height of up to 1000ft during climb out from, and/or below 200ft during approach to the aerodrome.</td>
<td>In the vicinity (within 13km) of an aerodrome, any birdstrike occurrence reported by the commander of an aircraft, where the aircraft is believed to be between 1000ft and 1500ft in the climb and between 1000ft and 200ft on approach.</td>
<td>Any birdstrike occurrence where an aircraft is believed to be beyond 13km from the aerodrome radius in the climb or not below 3000ft on approach.</td>
</tr>
</tbody>
</table>

Reporting
Birdstikes should be reported to the SCAA using any of the methods shown below:
a) Online Birdstrike Reporting system (preferred method). Reports should be submitted to the SCAA official website.
b) Birdstrike occurrences may also be reported to the SCAA using the SCAA BIRD STRIKE REPORTING Form
c) Submitting an air operator Air Safety Report (ASR). It is recommended that air operators ensure that details of birdstrikes are also provided to the aerodrome operator, as well as being reported to the SCAA, within 96 hours of the event.
Data Management and Information Sharing
Both mandatory and online reporting, where introduced have improved quality of reporting ever since. It would allow the SCAA to provide more reliable data and information to stakeholders.
Requests for the release of birdstrike data will be considered by the SCAA prior to authorizing to do so. A written request is required. Where the release of data and information is controlled by legislation and standards, the SCAA will comply with those standards and manage the release of such data accordingly.
The SCAA will publish general dis-identified statistics of birdstrike occurrences in the Seychelles, on the SCAA website. The SCAA is also obliged to send an annual return of all birdstrike data to ICAO for inclusion in their IBIS2 database.
Aerodromes and their stakeholders should, wherever possible, share information on birdstrikes locally. The aerodrome BCMP should contain a process to facilitate this.

Species Identification
For the purpose of ensuring accurate reporting and to aid risk assessment, it is essential that bird species information is provided when a report is sent to the SCAA. It is therefore important that every effort is made by the reporter to establish an accurate identification of the species of bird or wildlife that has been involved in the occurrence.
The aerodrome BCMP should clearly set out the procedures employed by operators in order to establish an accurate species identification following a birdstrike. When this is carried out by local aerodrome bird control personnel, the BCMP should detail how their training and competence is achieved and maintained. Where species identification cannot be achieved locally, the BCMP should detail what other means might be utilised (i.e. by employing the services of specialist bird remains identification organisations).

Chapter 6 Aerodrome Ornithology
To assess the risks that they represent and to adopt effective control measures, bird control personnel should be able to identify correctly, and be familiar with the ecology and behaviour of, all birds commonly encountered on the aerodrome.

The SCAA recommends that aerodrome operators seek specialist advice if necessary to help ensure that bird control operatives possess the skills and knowledge of bird species identification to enable them to discharge their duties effectively.

Bird Identification
Each bird species has a unique shape and plumage, as well as unique behaviour patterns and actions. Published field guides usually include practical information on how to observe and record the various field characteristics of a bird that enable it to be identified. When deciding upon which field guide to obtain, the following attributes should be considered:
a) good field guides cover the different groups of birds in a generally accepted taxonomic sequence, as follows (some smaller groups omitted).
b) field guides that illustrate birds with photographs or paintings of birds in varied poses should be avoided, because they probably will not include all the plumage variations within a species that may be encountered, making identification more difficult;
c) coloured paintings with birds in similar poses, and with plumage variations for each species described or illustrated, are more useful for identification;
d) illustrations of similar species from similar viewpoints showing all parts of the birds to best advantage and enabling easy comparison between species are better, e.g. side view standing plus in-flight views showing wing patterns and with plumage differences clearly indicated: male, female, juvenile, breeding, etc;
e) important differences between species must be made clear. If such identification points are not well illustrated or described, there will probably be similar problems with other birds; and
f) the text should provide information on at least the following: size, characteristic behaviour, comparison with similar species, habitats (seasonal and breeding), movements, populations (including seasonal changes), food, voice and nesting behaviour.

Appendix 1 of this document describes species familiar to Seychelles and its varying environs.

**Bird Biology**

Each bird species fills a niche in nature, and its behaviour varies with season, time of day, weather and other factors. Their way of life is based on mobility: some species migrate to exploit seasonal food abundance and to avoid harsh winters; some species commute daily between safe roosts and feeding grounds; and some take flight to avoid predators.

In comparison with a human, birds' eyes are relatively large compared to their body and their eyesight is at least twice as sharp. They also communicate vocally and have good hearing over about the same range of frequencies as humans. Therefore, they are unsusceptible to ultrasonic devices. Most birds have little or no sense of smell. Birds have not adopted the mammalian strategy of retaining young to develop to an advanced stage inside their bodies, prior to birth, because of the weight penalty. Being warm-blooded, eggs must be incubated in order to complete their development and hatch. Birds have thus evolved a system of nest building and parental care of young.

Birds observed in the field are almost always engaged in some activity that provides information about them. Song and call notes are often characteristic and, with experience, enable identification and even detection of unseen birds. Habitat and season are good indicators of species likely to be encountered.
Scientific Name: Alectroenas pulcherrima

- 38 - 40cm
- Unknown: at least 5,000 birds
- Seychelles only (endemic)
- Breeds on most large and medium islands, including Aride and Cousin
- Woodland, scrub, gardens
- A loose stick nest is built in trees and shrubs. One or two eggs laid
- Fruit
- A large pigeon, usually in trees. May look uniformly dark (like Black Parrot) but in good light, the pale blue neck and red head can be seen

A pigeon with plumage in three colours: Dark blue (body, wings), light blue (neck) and red (crown, wattle around eye) like the red, white and blue flag of Holland after which it is named. Young birds are a muddy green-blue colour. This species spends much of its life in the canopy of trees and eats the fruits of figs, bwa dir, ylang ylang and other trees. In the courtship flight, birds fly steeply upward before gliding down with their wings held stiffly down. Once it was shot for food and became quite rare, but populations have recovered and you can now see the bird on many islands. Recently, it has spread to Cousin and Aride.
**Scientific Name**  
*Coracopsis nigra barklyi*

<table>
<thead>
<tr>
<th>Habitats</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 - 54cm</td>
<td>Up to 300 birds</td>
</tr>
<tr>
<td></td>
<td>Perhaps endemic, but closely related birds in Madagascar and Comores</td>
</tr>
<tr>
<td></td>
<td>Praslin, with a few on Curieuse</td>
</tr>
<tr>
<td></td>
<td>Woodland, scrub, gardens</td>
</tr>
<tr>
<td></td>
<td>In hollow trees and nest boxes, two to three eggs laid</td>
</tr>
<tr>
<td></td>
<td>Fruit, both cultivated (mango etc.) and wild (fruit of native palms)</td>
</tr>
<tr>
<td></td>
<td>The only parrot on Praslin. Pale brown-grey all over. Usually occurs in small flocks, can be recognised by its distinctive whistling call</td>
</tr>
</tbody>
</table>

This parrot is brown-grey in colour, not truly black. Many bird experts treat it as a local form of a species found in Madagascar and Comores, but some think it is a separate species found nowhere but Seychelles. Here, it was once more widespread, but was killed by humans because it likes to eat cultivated fruit including mango, bilimbi and papaya. It survived on Praslin and is now protected by law. It nests in old hollow trees, which are rare because humans cut down trees for timber before they reach old age, and old trees may be removed because they are dangerous. Fortunately, the birds also use special deep nest boxes provided for them as a conservation measure.
SEYCHELLES SCOPS OWL

Scientific Name: Otus insularis

- **40cm.**
- Up to 360 birds.

- Seychelles only (endemic).

- **Mahé**

- Upland forests

- Nests in hollow trees, one white egg laid

- Feeds on insects, spiders, possibly frogs and small lizards

- **id.** A small brown owl with a two-note rasping (frog-like) call

The scops owl is nocturnal and mainly found in highland forests of Mahé, so it is rarely seen. It can sometimes be heard calling from tall trees; its usual call sounds like a frog or the rasping noise of a big saw on wood, giving the bird its Kreoel name. The Scops Owl was thought to be extinct for many years and no-one had seen a nest or egg until 1999, when these were discovered by a Nature Seychelles team. Most of its habitat is now within the Morne Seychellois National Park where it should be protected.
### Scientific Name
Aerodramus elaphrus

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>28cm</strong></td>
<td>Between 2,500 and 3,000 birds</td>
</tr>
<tr>
<td><strong>Seychelles only (endemic)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Breeds Mahé, Praslin, La Digue, but sometimes seen on other islands</td>
</tr>
<tr>
<td><strong>Forest</strong></td>
<td>Forests, wetlands, gardens, agricultural and urban areas</td>
</tr>
<tr>
<td><strong>Nest</strong></td>
<td>Nest communally in caves; small cup-shaped nests are built of plant matter and saliva. One egg laid</td>
</tr>
<tr>
<td><strong>Flying</strong></td>
<td>Flying insects</td>
</tr>
<tr>
<td><strong>Id.</strong></td>
<td>A small all-brown bird with long, pointed wings. Usually seen flying</td>
</tr>
</tbody>
</table>

Swiftlets are fast and accurate fliers and spend most of their life in the air. They feed by catching small flying insects in their mouth as they fly. The tiny cup-shaped nests made of plant scraps stuck together with saliva are attached to the walls or ceilings of caves. Inside the caves, swiftlets find their way using echolocation. You are most likely to see feeding groups of swiftlets in the morning or late afternoon, or in cloudy weather when they fly closer to the ground. The Seychelles Swiftlet does not seem to be in immediate danger of extinction but we still know little about its habits and where it nests.
Unlike many endemic birds, Seychelles Bulbuls are not in any immediate danger of becoming extinct. You can see them on all the largest islands from sea level to high altitudes in gardens and scrub, although they are particularly common in old woodland. They are noisy and aggressive birds, usually seen in small groups, with a range of chattering or squawking calls. Adults are the only Seychelles land birds with orange beak and legs, but in young birds the beak and legs are dull grey-brown.
Scientific Name  |  Copsychus sechellarum
--- | ---
29cm | About 125 birds
Seychelles only (endemic) |
Frégate, Cousin, Cousine and Aride |
Forests and gardens |
Built from grasses, fringes, usually in nestboxes or natural cavities in trees, sometimes in the top of coconut palms. A single egg is laid. |
Insects and other invertebrates, baby mice, fish dropped by seabirds |
id. A long-tailed, glossy black and white bird with black bill |

The most endangered of the endemic birds, Seychelles Magpie Robins came close to extinction in the late twentieth century; in 1970 there were only about 25 surviving birds on one island (Frégate Island). Through an active conservation programme, which involved removing predators, improving habitat and providing nestboxes on Frégate and moving birds to other predator-free islands to start new populations, the total number of birds has risen significantly, although it remains one of the rarest birds in the world. Unlike many land birds of the Seychelles, the Magpie Robin spends a lot of time feeding on the ground, so it is especially vulnerable to predators. It has a beautiful song.
### Seychelles Warbler

**Scientific Name**: Acrocephalus sechellensis

<table>
<thead>
<tr>
<th>Trait</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td>17 cm</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>About 2,100</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>Seychelles only (endemic)</td>
</tr>
<tr>
<td><strong>Habitat</strong></td>
<td>Cousin, Cousine and Aride</td>
</tr>
<tr>
<td><strong>Egg Color</strong></td>
<td>Lowland forest and scrub</td>
</tr>
<tr>
<td><strong>Egg Size</strong></td>
<td>A cup-shaped structure, made of grass, coconut fibres, etc. One or two eggs</td>
</tr>
<tr>
<td><strong>Egg Shape</strong></td>
<td>(rarely up to four).</td>
</tr>
<tr>
<td><strong>Egg Color</strong></td>
<td>Small insects caught on vegetation</td>
</tr>
<tr>
<td><strong>Egg Size</strong></td>
<td>A small, brown bird, about the size of a fody but slimmer, with longer legs</td>
</tr>
<tr>
<td><strong>Egg Shape</strong></td>
<td>and a narrow beak.</td>
</tr>
</tbody>
</table>

Like the Seychelles Magpie Robin, the Seychelles Warbler came very close to extinction in the twentieth century. In 1968 there were about 26 birds left in a small patch of mangrove trees on Cousin Island. Cousin Island was declared a nature reserve in 1968; coconut palms were removed and native trees grew up all over the island. The warbler population increased rapidly as warblers moved into the new habitat. In 1988 and 1990 birds were moved to the nearby predator-free islands of Aride and Cousine. This is one of the big conservation success stories in Seychelles. Further transfers could allow this species to be removed from the list of threatened birds.
SEYCHELLES PARADISE FLYCATCHER

NATIVE LAND BIRDS

Female

Male

Scientific Name: Terpsiphone corvina

- 23cm
- About 230 birds
- Seychelles only (endemic)
- La Digue and Marianne
- Native forest
- Small, cup-shaped, built of fine pieces of casuarina, coconut fibre stuck together with spider webs, at the tips of down-hanging twigs. One egg
- Winged insects and spiders, caught in mid-air or picked from leaves
- A small bird; males glossy black with long tail feathers, females and young with shorter tail, white belly and red-brown back

Although it was once widespread on Praslin and all its surrounding islands, the Vev is now restricted La Digue, where it is quite common. Birds have been seen on Marianne but it does not seem to breed there. The Vev thrives in tall forest of native trees (takamaka and bodanmyen), especially on the plateau of La Digue. It feeds on insects, flying to catch them in mid-air or pick them from underneath leaves. La Digue has rats and cats and plenty of human activity but despite this, numbers of this bird have increased in recent years, perhaps because people have stopped killing them.
**Scientific Name**  
*Nectarinia dussumieri*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 16cm</td>
<td>At least 20,000 birds</td>
</tr>
<tr>
<td>Seychelles only (endemic)</td>
<td></td>
</tr>
<tr>
<td>Almost all the granitic islands</td>
<td></td>
</tr>
<tr>
<td>Forest, scrub, gardens, from sea level to mountain peaks</td>
<td></td>
</tr>
<tr>
<td>Hanging nests, made of grass and moss bound with spider webs. A single egg is laid</td>
<td></td>
</tr>
<tr>
<td>Nectar, insects</td>
<td></td>
</tr>
<tr>
<td>A tiny bird with a down-curved thin bill and (in males) an iridescent throat patch</td>
<td></td>
</tr>
</tbody>
</table>

The tiny sunbird is one of the few endemic species that has thrived since humans arrived here. It can live alongside introduced predators like rats and cats, perhaps because its beautiful hanging nest, built on the end of twigs, gives the egg and chick protection. Sunbirds feed in gardens as well as native forests, visiting hibiscus (hibiskis) and other flowers. They use their narrow, curved beaks to reach sugary nectar from flowers and also catch small insects. The male has a shiny violet-green bib and yellow tufts (hard to see) under each wing. Sunbirds are active, noisy birds, with a surprisingly loud song.
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Zosterops modestus</th>
</tr>
</thead>
<tbody>
<tr>
<td>15cm</td>
<td>Less than 400 birds</td>
</tr>
<tr>
<td>Seychelles only (endemic)</td>
<td></td>
</tr>
<tr>
<td>Mahé, Conception, Frégate</td>
<td></td>
</tr>
<tr>
<td>Forest and scrub, gardens</td>
<td></td>
</tr>
<tr>
<td>Cup-shaped, built of grass, moss and spider webs. Two eggs laid</td>
<td></td>
</tr>
<tr>
<td>Insects, small fruit</td>
<td></td>
</tr>
<tr>
<td><strong>id.</strong> A small grey bird, paler beneath. Each eye has a narrow white eye ring</td>
<td></td>
</tr>
</tbody>
</table>

On Mahé, this endemic bird is rare and may sometimes be seen in gardens and forest over 300m at La Misère, Cascade and a few other places. It was regarded as one of the most endangered of the Seychelles endemic birds until in 1997 a thriving population was discovered on Conception Island. Since then, research has been carried out on the species and it has been successfully introduced to Frégate Island. In addition to insects, the white-eye feeds on fruits of native and introduced plants.
The Seychelles Fody is less colourful than its introduced relative the Madagascar Fody, and is a species of forest or scrub habitats. It seems unable to survive alongside black rats and is now restricted to a few islands. It has a strong, broad bill and can tackle all sorts of food. On the small seabird islands where it lives, it can eat the eggs of birds, especially Fairy Terns. When adult terns are disturbed, the fody tips the egg from its branch onto the ground to smash it, and then eats it. In the past, when people harvested seabird eggs on these islands, Seychelles fodies were regarded as a pest. Now, both seabirds and fodies are protected and they survive easily alongside each other.
**Scientific Name**  
Psittacula krameri

- **42 - 48cm**  
- **About 50 birds**

- **India & Central Africa (native), Europe, the Middle East, USA, China, S. Africa, Mauritius & Seychelles (introduced).**

- **Mahé, Cerf, Silhouette**

- **Gardens, woodland, scrub**

- **In holes in trees, and in buildings. Two to six eggs laid**

- **Fruit and seeds**

- **The only long-tailed green bird on Mahé, usually in small flocks**

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Rose-ringed Parakeets were seen occasionally on Mahé from the 1970s but only in any number since 1997. The first birds were probably pets, released accidentally or even on purpose. Now there could be over 50. They are attractive, lively birds but are very good at establishing themselves where they are introduced, sometimes becoming pests of gardens and orchards. Parrots can also harbour diseases of humans and birds. In Mauritius, where they have been introduced, they compete with an endangered endemic parrot, the Echo Parakeet, for food and nesting sites. Here they could pose a threat to Black Parrots and the Ministry of Environment is undertaking an eradication programme.
**BARN OWL**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Tyto alba</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>85 - 93cm</strong></td>
<td>Unknown: thousands of birds</td>
</tr>
<tr>
<td>Worldwide</td>
<td></td>
</tr>
<tr>
<td>All large islands, many medium-sized islands</td>
<td></td>
</tr>
<tr>
<td>Gardens, woodland, scrub</td>
<td></td>
</tr>
<tr>
<td>Holes in trees and rocks. No nest material. Four to eight eggs laid in a shallow depression</td>
<td></td>
</tr>
<tr>
<td>Rats and mice, birds, insects</td>
<td></td>
</tr>
<tr>
<td><strong>id.</strong></td>
<td>A large pale owl. The only owl in coastal areas and off Mahé</td>
</tr>
</tbody>
</table>

The Barn Owl is one of the most widespread birds in the world; its natural distribution includes all continents except Antarctica. It is only absent from deserts, Arctic regions and some remote islands. It was not present in Seychelles when people arrived here but was deliberately introduced in the 1950s to control rats. On the larger islands, owls do eat mainly rats, although perhaps not enough to make a big difference in the rat population. They have reached the small islands where seabirds nest, where there are no rats. Here they eat birds, especially Fairy Terns and some endangered species. The Ministry of Environment gives a reward for Barn Owls that are caught and killed.
**BARRED GROUND DOVE**

**Geopelia striata**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Geopelia striata</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>24 - 26cm</strong></td>
<td>Unknown; Tens of thousands of birds</td>
</tr>
<tr>
<td><strong>SE Asia to Australia; introduced widely on Indian Ocean islands</strong></td>
<td></td>
</tr>
<tr>
<td><strong>All large or medium-sized islands</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Open habitats: Gardens, plantations, scrub</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Small, built of twigs in shrubs, trees and palms. Two eggs laid</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mainly seeds, also small insects</strong></td>
<td></td>
</tr>
<tr>
<td><strong>id.</strong></td>
<td>A tiny long-tailed dove. Grey with narrow darker bars, pink breast and blue bill</td>
</tr>
</tbody>
</table>

The Barred Ground Dove or Zebra Dove is a pretty, small pigeon seen almost everywhere in Seychelles. It prefers very open, grassy places around human settlement and is less common in forest. Its cooing call can be heard throughout built-up places. Wherever there are seeds, or crumbs or rice are dropped, pairs or small groups of ground doves can be seen picking at tiny morsels of food. Male ground doves court females by following them and bowing down, raising their long tails to the vertical and fanning them slightly, showing the white tips of the black tail feathers.
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Columba livia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td>Unknown: Hundreds of birds</td>
</tr>
<tr>
<td><strong>Average Length</strong></td>
<td>63 - 70cm</td>
</tr>
<tr>
<td><strong>Habitat</strong></td>
<td>Found all over the world, especially in urban areas</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Mahé, Praslin</td>
</tr>
<tr>
<td><strong>Behaviour</strong></td>
<td>Towns</td>
</tr>
<tr>
<td><strong>Nest</strong></td>
<td>Untidy, twiggy nest built on ledges on buildings. Two eggs laid</td>
</tr>
<tr>
<td><strong>Diet</strong></td>
<td>Mainly seeds and discarded food</td>
</tr>
<tr>
<td><strong>Identification</strong></td>
<td>A large, stocky pigeon with plumage in a variety of colours, either grey or white or brown</td>
</tr>
</tbody>
</table>

The Feral Pigeon is derived from a wild bird, the Rock Dove, which lives on rocky cliffs in Europe, Asia and North Africa. Humans have domesticated this bird, developing many different varieties for food, as homing pigeons or for their decorative value. But domestic birds have returned to the wild, or at least semi-wild, living in cities and nesting on buildings like their original homes on rocky cliffs. Because they are successful at living alongside people in cities, they have become very common and widespread. Although in Seychelles they are not kept for food as much as they once were, there are many feral birds on Mahé - for example, around the National Library.
**Scientific Name**  
*Estrilda astrild*

<table>
<thead>
<tr>
<th>12 - 14cm</th>
<th>Unknown: Hundreds of birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Much of Africa (native), Spain, Portugal, Mauritius and Seychelles (introduced)</td>
<td></td>
</tr>
<tr>
<td>Mahé, La Digue (also Alphonse in the outer islands)</td>
<td></td>
</tr>
<tr>
<td>Gardens, plantations, scrub</td>
<td></td>
</tr>
<tr>
<td>Large, domed nest, in shrubs or low trees. Four or five eggs laid</td>
<td></td>
</tr>
<tr>
<td>Mainly seeds, for example from fatak grass</td>
<td></td>
</tr>
<tr>
<td>A very small bird with a bright red eye stripe and beak. Beak black in juveniles (as illustrated). Usually in a flock</td>
<td></td>
</tr>
</tbody>
</table>

Waxbills were brought here as cage birds and either escaped, or were deliberately released. In the nineteenth century they were important agricultural pests as they fed on the seeds of grasses including rice. Now they are less common and you are only likely to see them on parts of Mahé and the plateau of La Digue. Rice is no longer grown here and they eat seeds of other grasses, particularly fatak. Waxbills form flocks that fly around grassy places such as roadsides, making high-pitched twittering calls as they fly.
### Scientific Name

**Foudia madagascariensis**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 - 19cm</td>
<td>Unknown: Hundreds of thousands of birds</td>
</tr>
</tbody>
</table>

**Habitat**

- Madagascar (endemic), Mauritius, Rodrigues, Seychelles (introduced)
- Throughout. This is the most widespread land bird in Seychelles, breeding even on tiny, remote islands
- Gardens, plantations, scrub, grassland

**Nest**

- Domed, woven nest in palms, trees or shrubs. Two to five eggs laid

**Diet**

- Mainly seeds, also insects (especially in breeding season)

**Appearance**

- In breeding season, male is scarlet all over (a few are bright yellow). Out of breeding season, grey-brown with red patches. Females always grey-brown

---

**Fody** species are found on many islands in the Indian Ocean, with species endemic to Madagascar, Comores, Mauritius, Rodrigues, Aldabra and the granitic Seychelles. This is probably the most colourful, which is why it has been introduced to many places. In the breeding season, male birds are bright red with dark wings and black face mask. Outside the breeding season, males lose much of their red colouring. Females are grey-brown all year round. May occur alongside the endemic Seychelles Fody, but the two species do not seem to compete. This bird prefers open places where it feeds mainly on seeds, while the toktok likes forest, feeding mainly on insects. The woven hanging nest is constructed using grasses, coconut fibre and other material.
### Scientific Name
*Passer domesticus*

**21 - 26cm**

Perhaps only a few birds in the granitic islands (established populations on many of the Amirantes)

**Europe, Africa, Asia, Australia, North and South America**

**Mahé**

**Built-up areas**

In buildings. Three to six eggs laid

**Mainly seeds, but also other plant material, insects, snails**

**Male is red-brown above and has a black bib. Female looks like a female Madagascar Fody but sparrow is larger with a white patch on the wing**

---

The House Sparrow is one of the most widespread birds in the world. It is successful because it can live close to humans in towns and cities, nesting in buildings, and has a broad diet. Its natural home seems to be Europe and parts of North Africa and Asia. It was introduced to the coral islands of the Amirantes in the nineteenth century but did not establish a breeding population on the granite islands until about 2002, when a small colony was found in the port area of Mahé. This has been controlled but it is possible that some birds survive. Also, because this bird is found all over the world, individual birds will probably be brought in repeatedly on ships.
**COMMON MYNAH OR INDIAN MYNA**

**MARTEN**

**INTRODUCED LAND BIRDS**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th><em>Acridotheres tristis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>33 - 37cm.</strong></td>
<td><strong>Unknown: Tens of thousands of birds</strong></td>
</tr>
<tr>
<td>****</td>
<td><strong>Asia (where native), Madagascar, South Africa and Indian Ocean Islands, Australia, warm islands throughout the world (where introduced)</strong></td>
</tr>
<tr>
<td>****</td>
<td><strong>All large and medium-sized islands; absent from a few tiny, remote islands</strong></td>
</tr>
<tr>
<td>****</td>
<td><strong>Beaches, urban areas, gardens, plantations, scrub, forest from sea level to mountaintops</strong></td>
</tr>
<tr>
<td>****</td>
<td><strong>Untidy twig nest in coconut tops, hollow trees, roofs, etc. Two to six eggs laid</strong></td>
</tr>
<tr>
<td>****</td>
<td><strong>Fruit, insects, birds eggs, lizards, seeds, household scraps</strong></td>
</tr>
<tr>
<td><strong>id.</strong></td>
<td><strong>A medium-sized brown-black bird with white wing patches (obvious in flight) and yellow beak; yellow skin around eye</strong></td>
</tr>
</tbody>
</table>

The mynah is one of the most successful birds in Seychelles. It is found on almost all the islands and in all habitats, and eats all kinds of food. It can make its nest in the top of a coconut palm, in hollow trees or in houses. It is a popular cage bird in many parts of the world because it can mimic sounds and speech. Wild birds can mimic the calls of other birds. Mynahs are aggressive and compete with other birds for nest spaces. They may also eat the eggs or young chicks of other birds. The endemic birds of Seychelles are particularly vulnerable to this kind of competition and for this reason mynahs are controlled on some islands.
Shearwaters are fast-flying seabirds that fly close above the water surface far out at sea, feeding on small fish and invertebrates. They pick their prey from the water surface or dive to catch it, using their wings and feet to propel themselves underwater. At night, they return to nesting colonies on land, making weird wailing noises as they fly in to land and throughout the night. They nest underground, in burrows and under rocks, and suitable predator-free islands are densely covered in shearwater burrows. Their young, fat chicks, were traditionally collected as food. Now, most breeding colonies are protected by law.
Scientific Name: *Puffinus herminieri*

- **64 - 74cm**
- Throughout the tropics
- Breeds on predator-free islands, including Aride, Bird, Cousin, Cousine, Récif, Mamelles. Also in the Amirantes and Aldabra to the South
- In burrows in earth, under rocks. One egg laid
- Dives to catch small fish and squid
- A small seabird, dark above and white below, with short rounded wings

This is a much smaller shearwater than the Wedge-tailed, and has a white throat and belly. The two species often nest on the same islands; like the Wedge-tailed Shearwater, Audubon's Shearwaters nest in burrows and are vulnerable to predation by introduced mammals and humans. Around dusk, birds wait offshore for darkness to fall, before flying to their nesting burrows. At night the breeding colonies are noisy with their loud calls.
A beautiful, long-tailed white seabird. The White-tailed Tropicbird breeds on almost every island, including the large islands like Mahé and Silhouette, where it nests in trees and bird's nest fens in high-altitude forests. However, birds that breed on predator-free islands are more successful. Here, birds often nest on the ground at the base of trees. There is intense competition for good nest sites, with birds fighting viciously for the best spots. Young birds are grey and fluffy, and do not grow long tail feathers for a year or more. When their chicks are fatter than they are themselves, adult White-tailed Tropicbirds abandon them; the chicks become so hungry that they make their own way to the sea.
### Scientific Name

**Puffinus lherminieri**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>64 - 74cm</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Throughout the tropics</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Breeds on predator-free islands, including Aride, Bird, Cousin, Cousine, Récf, Mamelles. Also in the Amirantes and Aldabra to the South</strong></td>
<td></td>
</tr>
<tr>
<td><strong>In burrows in earth, under rocks. One egg laid</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Dives to catch small fish and squid</strong></td>
<td></td>
</tr>
<tr>
<td><strong>A small seabird, dark above and white below, with short rounded wings</strong></td>
<td></td>
</tr>
</tbody>
</table>

About 60,000 PAIRS in the granitic islands, and less than 100 PAIRS on Aldabra.

This is a much smaller shearwater than the Wedge-tailed, and has a white throat and belly. The two species often nest on the same islands; like the Wedge-tailed Shearwater, Audubon's Shearwaters nest in burrows and are vulnerable to predation by introduced mammals and humans. Around dusk, birds wait offshore for darkness to fall, before flying to their nesting burrows. At night the breeding colonies are noisy with their loud calls.
WEDGE-TAILED SHEARWATER  

**Scientific Name**  
Puffinus pacificus

- **Size**: 97 - 104cm
- Around 60,000 PAIRS in the granitic islands, at least 25,000 birds more on outer islands

**Distribution**  
Throughout the Indian Ocean and Pacific

- Breeds on predator-free islands, including Aride, Bird, Cousin, Cousine, Récif, Mamelles. Also in the Amirantes to the South

**Breeding**  
- In burrows in earth, under rocks. One egg laid
- Dives to catch small fish and squid
- An all-dark seabird, skims over the waves in flight

Shearwaters are fast-flying seabirds that fly close above the water surface far out at sea, feeding on small fish and invertebrates. They pick their prey from the water surface or dive to catch it, using their wings and feet to propel themselves underwater. At night, they return to nesting colonies on land, making weird wailing noises as they fly in to land and throughout the night. They nest underground, in burrows and under rocks, and suitable predator-free islands are densely covered in shearwater burrows. Their young, fat chicks, were traditionally collected as food. Now, most breeding colonies are protected by law.
## Scientific Name
Phaethon rubricauda

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Phaethon rubricauda</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>104 - 119cm</strong></td>
<td>Only 3-5 PAIRS in the granitic islands; many more (over 2,000 PAIRS) at Aldabra</td>
</tr>
<tr>
<td>Throughout Indian Ocean and Pacific</td>
<td>Breeds on Aride only</td>
</tr>
<tr>
<td>On cliffs, under a granite overhang. One egg laid</td>
<td>Flying fish</td>
</tr>
<tr>
<td>A white seabird with thin red tail, and an obvious red beak</td>
<td></td>
</tr>
</tbody>
</table>

The Red-tailed Tropicbird is similar to the more common White-tailed Tropicbird but is bigger, with a pure white body, red bill and a very thin red tail, which is not always visible in flight. During the breeding season, the feathers of some birds take on a pinkish flush. The Red-tailed Tropicbird is very rare as a breeding species on the granitic islands, perhaps because it is unable to coexist with rats and cats, or because of human persecution in the past.
### Great Frigatebird

**Scientific Name:** *Fregata minor*

- **Length:** 205 - 230cm
- **Habitat:** Atlantic, Indian, and Pacific Ocean
- **Breeding:** Abundant throughout Seychelles, but only breeds at Aldabra and nearby islands
- **Laying:** In mangroves. One egg laid
- **Feeding:** Flying fish, fish stolen from other seabirds, baby turtles
- **Description:** A huge black seabird with long wings. Male is all-black, female has white chest patch and juvenile white chest patch and head

Frigatebirds are long-distance fliers and spend most of their life flying over the ocean with a gliding, rarely flapping flight. Unlike other seabirds, the feathers have poor waterproofing and the feet are not webbed. They cannot land on the sea or dive for food, but must pick prey from the water surface or attack other birds to make them give up their own prey. They build twiggy nests in the tops of mangroves on Aldabra. The males use an inflated bright red throat pouch to display to females; outside the breeding season the pouch is usually invisible. Young birds are dependent on the parents for over a year, so the birds can only breed every couple of years.
The Lesser Frigate is like a smaller version of the Great Frigate, but both males and females have white markings extending onto the undersides of each wing. Like Great Frigates, juveniles have a white or pale buff head. They are often seen alongside the larger species, although many more Great than Lesser Frigates occur around the granite islands of Seychelles. In Seychelles, Lesser Frigates only nest around Aldabra Atoll, where they may build their nests alongside Great Frigates. However, Lesser Frigates use a wider range of trees and shrubs for nesting than do Great Frigates, and choose slightly different nest locations within each tree.
**Scientific Name**  
*Thalasseus bergii*

<table>
<thead>
<tr>
<th>Size</th>
<th>125 - 130cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>300-700 breeding pairs in the Seychelles, all on the southern coral islands</td>
</tr>
<tr>
<td>Habitat</td>
<td>Indian Ocean, Pacific, Red Sea and Persian Gulf</td>
</tr>
<tr>
<td>Behavior</td>
<td>Breeds on Aldabra and Amirantes; outside breeding season, occurs throughout the Seychelles</td>
</tr>
<tr>
<td>Breeding</td>
<td>On the ground, on bare earth on small islets. One or two eggs laid</td>
</tr>
<tr>
<td>Diet</td>
<td>Fish, squid, turtle hatchlings</td>
</tr>
<tr>
<td>Identification</td>
<td>A large tern, grey above and white below with a forked white tail, heavy greenish-yellow beak and shaggy black crest</td>
</tr>
</tbody>
</table>

This large tern does not breed around the granitic islands but can be seen here at all times of the year, flying along beaches alone or roosting on sandbanks in small groups. Greater Crested Terns breed on Aldabra, Cosmoledo and a few other outer islands, and some birds can be seen around these breeding sites all year round. When feeding, birds dive from the air into water to catch fish, squid and other prey. They also pick turtle hatchlings from the surface of the water.
Scientific Name: *Sterna dougallii*

- Breeding population of about 1,600 PAIRS in Seychelles; 1,200 of these on the granitic islands (Aride).
- Worldwide in warmer oceans, also western Europe and North America.
- Breeds on Aride, with small populations on two of the Amirante Islands.
- Nests on the ground in big colonies. One or two eggs laid.
- Fish.
- In breeding season, underside white or pink, beak red, cap black. When not breeding, bill black and cap black only behind the eyes.

The Roseate Tern has a very wide distribution around the world but almost everywhere it occurs, populations are declining. Many breeding colonies in Seychelles have been lost through the introduction of predators (rats and cats), collection of eggs by humans or habitat change. Now only one large colony remains, on Aride Island. Here, they have been threatened by introduced Barn Owls killing the adults. Breeding success is very variable, depending on the food supply (small fish) available during the breeding season (May-August). Climate change could affect the numbers of fish available while the birds are rearing their young.
**Scientific Name**  
*Sterna fuscata*

- **82 - 94cm**  
  At least 3 million PAIRS; 1 million PAIRS in the granitics, 2 million on outer islands

- **Worldwide in warmer oceans**

- **Breeds on Aride, Bird Island, Cousine, Récif, and other small islands. Also several coral islands to the South (African Banks, Cosmoledo, Desnouefs)**

- **Nests on the ground in large colonies. One egg laid**

- **Small fish, squid**

- **A large tern, black above and pure white below**

This large, black-backed tern is found throughout the world’s tropical seas and is the most abundant seabird in Seychelles. However, because it nests on the ground in dense colonies, it is vulnerable to disturbance and predation during the breeding season. Several former colonies in Seychelles have been lost. For many years, the eggs have been collected for food locally and for export. Today, egg-collecting is controlled by the Ministry of Environment and populations are monitored by scientists. If eggs are collected early in the breeding season, females can lay a second. New research indicates that birds may move between colonies in Seychelles.
The Bridled Tern looks similar to the Sooty Tern but is smaller and grey above, rather than pure black. Colonies are smaller, and less densely packed with birds, than those of the Sooty Tern. In Seychelles, breeding does not take place annually as for most seabirds, but every eight months. All the birds in a colony nest at the same time although birds in different colonies do not necessarily nest at the same time. The Bridled Tern is not such a long-distance traveller as the Sooty Tern. Mostly it stays around the breeding islands.
### Scientific Name
**Anous stolidus**

<table>
<thead>
<tr>
<th>Trait</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>75 - 86cm</td>
</tr>
<tr>
<td>Distribution</td>
<td>At least 15,000 PAIRS in the granitic islands; another 7-15,000 PAIRS on outer islands</td>
</tr>
<tr>
<td>Habitat</td>
<td>Tropical Atlantic and Indian Ocean</td>
</tr>
<tr>
<td>Breeding</td>
<td>Breeds on predator-free granite islands and all coral islands; seen throughout Seychelles</td>
</tr>
<tr>
<td>Nesting</td>
<td>In coconut palms (where it builds a nest) or on the ground (no nest). One egg laid</td>
</tr>
<tr>
<td>Diet</td>
<td>Small fish, squid</td>
</tr>
<tr>
<td>Identification</td>
<td>A brown tern, larger than Lesser Noddy and with less white on head</td>
</tr>
</tbody>
</table>

The Brown (or Common) Noddy is a medium-sized brown seabird with a pale white-grey forehead. It is larger than the Lesser Noddy and has a relatively short, stout beak. Brown Noddies breed from April to September, often building nests from sticks or seaweed in the tops of coconut palms. On predator-free islands, some birds breed on the ground, laying an egg directly onto rock ledges without building a nest. The adult birds feed in flocks, picking small fish or squid from near the surface of the water.
### Scientific Name

**Anous tenuirostris**

#### Measurements

- **60 - 70cm**

#### Distribution

- Western Indian Ocean, Western Australia

#### Behavior

- Breeds on rat and cat-free islands including Aride, Bird, Cousin, Cousine, Frégate
- In trees, especially Mapou (Pisonia); a small nest of leaves is built. One egg laid
- Small fish, squid

#### Identification

- A smaller noddy, with a long, slender beak

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The Lesser Noddy is smaller and slimmer than the Brown Noddy, and has a very long narrow beak. Its head has a larger pale area than in the Brown Noddy, but the demarcation between light and dark areas is less sharp. Lesser Noddies nest in the southeast season (from April to October), always in trees. They build platform nests out of wilted Pisonia leaves, on the branches of trees on rat-free islands. Lesser Noddies feed in flocks, flying within a few metres of the water and swooping to pick small fish and squid from just beneath the surface.
### FAIRY TERN OR WHITE TERN

#### Scientific Name

**Gygis alba**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 - 87cm</td>
<td>At least 14,000 PAIRS on the granitics, several thousand more PAIRS on outer islands</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical islands all around the world</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breeding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeds on all islands</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feeding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish, squid and crustaceans</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The only all-white tern. In adults, the base of the beak is blue</td>
<td></td>
</tr>
</tbody>
</table>

The Fairy Tern is a beautiful bird seen on all islands in Seychelles, even islands like Mahé where they are killed by introduced rats, cats and Barn Owls. They are usually seen flying around trees in pairs. Fairy Terns use trees for breeding, although they do not build a nest. Instead, the female lays a single egg on a bare branch, usually where there is a knot or fork to support the egg. She will sit on the egg to prevent it falling from the branch. As soon as the egg hatches twenty-one days later, the fluffy chick clings on to the branch with its large clawed feet. The adults feed the chicks small fish, which are carried crossways in the parent’s beak.
MIGRANT WADERS

Shallow seas and estuaries are very rich in invertebrate life. Many birds feed on the worms, crabs and shellfish in these habitats; often, they have long bills for probing sand and mud where their prey lives, and long, featherless legs to wade through the water. They are called waders. At least 17 species of wader are annual visitors to Seychelles, but none of them breed here; they are all regular migrants.

Most of the waders breed far to the North, in Siberia or the far north of Europe about 10,000km from Seychelles. There, in the short northern summer the sun hardly sets and huge areas of marshy ground and lakeshores are suddenly rich in insects and other invertebrates. The birds nest on the ground and rear their young, exploiting this explosion of food. However, they cannot survive the harsh winters when the ground is frozen, and migrate South to the Seychelles, East African coasts and other places for the winter. Most arrive in October or November and leave around May. Some birds that are not old enough to breed may not make the long and difficult journey North in the following year but stay year-round in the Seychelles, so there are always a few turnstones, whimbrels and grey plovers present on beaches here.

One species that does not breed in Russia is the Crab Plover or Kavalye. This distinctive black and white bird with a heavy black bill for cracking open crabs and shellfish breeds in the Red Sea and Persian Gulf.

Above: Breeding grounds of three waders that winter in Seychelles
The regular migrant waders you are likely to see in the Seychelles are shown in the photographs in this section and described briefly below, roughly in order of size. Notes on these species are not particularly detailed because none of these birds breed here, and all may be seen in similar habitats (beaches, mudflats, mangroves and freshwater wetlands, and grassy open places on land). For all species the peak season is between October and May.

1. Curlew - Gran Korbizo - Numenius arquata
   Wingspan: 80-100cm.
   A large bird with a very long, downcurved beak. Usually solitary.

2. Whimbrel - Korbizo - Numenius phaeopus
   Wingspan: 76-90cm.
   Like the curlew, but smaller with a shorter, less strongly curved beak and with two dark brown stripes on the top of the head. Sometimes seen in large groups. Much more common than the Curlew in the Seychelles.

3. Crab Plover - Kavalye - Dromas ardeola
   Wingspan: 75-78cm.
   An unmistakable black and white bird with a heavy black beak for crushing and eating crabs. Around the southern coral islands of Seychelles, this bird is seen in huge flocks. On the granite islands it occurs in smaller numbers.

4. Bar-tailed Godwit - Limoza Lake Are - Limosa lapponica
   Wingspan: 62-72cm.
   About the size of a Whimbrel, but with a straight (in fact, slightly upturned) beak. Usually seen in pairs or small groups.

5. Common Greenshank - Lapat Ver - Tringa nebularia
   Wingspan: 68-70cm.
   A tall, slim pale grey bird with greenish legs and a long slightly upturned beak. Wades in shallow water, dashing to chase small fish.

6. Grey Plover - Plovye Sann - Pluvialis squatarola
   Wingspan: 71-83cm.
   A large, heavily-built plover. This species is more common than the Pacific Golden Plover (see below). The Grey Plover always has black 'armpits' visible when it flies; the Golden Plover does not.
7. Pacific Golden Plover - Plovye Dore - Pluvialis fulva
Wingspan: 60-68cm.
A fairly large plover. Usually browner in colour, smaller and slimmer than the Grey Plover.

Larger waders, relative size silhouettes.

8. Terek Sandpiper - Sifler Trakase - Xenus cinereus
Wingspan: 57-59cm.
A medium-sized bird with bright orange-yellow legs and feet, and yellowish upturned beak. Usually seen singly in flocks of other waders.

9. Wood Sandpiper - Sifler Pye Dibwa - Tringa glareola
Wingspan: 56-57cm.
A long-legged sandpiper, larger and taller than the Common Sandpiper. Often at the edge of freshwater pools, usually solitary.

10. Greater Sandplover - Gran Plovye Ordiner - Charadrius leschenaultii
Wingspan: 53-60cm.

11. Lesser Sandplover - Pti Plovye Ordiner - Charadrius mongolus
Wingspan: 45-58cm.
Lesser and Greater Sandplover are very similar but differ in size and in leg and bill length, and posture. The Greater has longer legs (usually paler grey than those of the Lesser) and a heavier, longer bill with a long, pointed tip. Its stance is more horizontal, while the Lesser is more upright. In breeding plumage, males of both species are brightly coloured with black mask, white chin and orange breast and forehead. The male Greater Sandplover in breeding plumage has a small white patch just above the beak, an area that is all black in the Lesser.
12. Turnstone - Bezros - *Arenaria interpres*
   Wingspan: 50-57cm.
   The commonest wader in Seychelles, often in flocks of 30 or more. Can be seen on rocky shores and remote islands as well as on mudflats. Has bright orange legs and dark chest collar. Young birds stay in Seychelles all year round.

13. Common Ringed Plover - Plovye Kolye Nwanr - *Charadrius hiaticula*
   Wingspan: 48-57cm.
   A small wader with a dark ring round its neck, and orange legs. Normally seen singly, with other small waders. The beak may have an orange base and black tip, or may be all-dark.

14. Curlew Sandpiper - Bekaso Korbizo - *Calidris ferruginea*
   Wingspan: 42-46cm.
   A small wader, usually seen in small flocks. It has a downcurved bill like a miniature curlew. At high tide, flocks feed inland in areas of short grass.

15. Sanderling - Bekaso Blan - *Calidris alba*
   Wingspan: 40-45cm.
   A small, plump, whitish wader normally seen in small numbers on sandy beaches. It runs along the beach feeding on invertebrates in the sand freshly exposed by receding waves, running back up the beach out of the way of incoming waves.

16. Common Sandpiper - Siffer Bat Lake - *Actitis hypoleucus*
   Wingspan: 38-41cm.
   A small brown wader, usually seen by itself around the margins of water (freshwater and the sea). Can be recognised by its colour and the way it bobs its tail.

17. Little Stint - Pti Pti Bekaso - *Calidris minuta*
   Wingspan: 34-37cm.
   A tiny wader, usually seen by itself in groups of other species. The juvenile (photo) has a reddish neck - in overwintering adults, the neck is greyer.
**Species Name**: Ardea cinerea

<table>
<thead>
<tr>
<th>Length</th>
<th>175 - 195cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes</td>
<td>40 birds in 1995; many more now</td>
</tr>
<tr>
<td>Distribution</td>
<td>Africa (and Madagascar), Europe and Asia</td>
</tr>
<tr>
<td>Habitat</td>
<td>Breeds on Mahé, Houdoul Island, seen throughout Seychelles</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>Marshes, streams, beaches</td>
</tr>
<tr>
<td>Nesting</td>
<td>A large platform of sticks, in trees. Two to four eggs laid</td>
</tr>
<tr>
<td>Diet</td>
<td>Fishes, frogs, shellfish from sea and freshwater</td>
</tr>
<tr>
<td>Appearance</td>
<td>A large long-legged and long necked bird with a long, spear-like beak</td>
</tr>
</tbody>
</table>

This is the largest wading bird you are likely to see in Seychelles, and it is the only bird to return to the granitic Seychelles after being made extinct here. Some time before 1970, all the grey herons in the central Seychelles were killed by people for food, although they survived on some outer islands. Birds returned in the 1980s, and were breeding again on Mahé by 1990.

Grey Herons build their large, untidy nests in trees, usually in small colonies. You can see Grey Herons fishing in streams in central Victoria. Sometimes in built-up places they are injured or killed by cars or when they fly into power lines.