Quelea

The scourge of farmers throughout the continent, queleas are often referred to as 'avian locusts'. Through sheer weight of numbers they have the capacity to strip land bare overnight and despite the drastic measures that are employed to control the population, they continue to thrive. Penn Lloyd examines the survival strategies that make the quelea one of the most successful bird species on earth. ►

Photographs by J & B Photographers

Smudging the sky like eddies of smoke over a dying flame, swarms of small birds swirl restlessly over the trees, down to the water's edge and up again in a continual blur and whir of fluttering wings. The birds flying in to drink at the waterhole are Red-billed Queleas Quelea quelea, and their display of synchronous flying gives the impression of a single, monstrous organism rising, falling and swaying unpredictably over the pan with a muffled roaring from bursts of frenzied flight. It is impossible to track the path of an individual – the energy of the swarm is hypnotic ...

Watching and waiting, Tawny Eagles gather while the quelea flock swirls about them. It is difficult for predators to single out individual prey in the blur of movement.

Queleas are famous in the bird world for their spectacular aggregations. Massed flocks of literally millions of birds on migration have been reported to darken the sky as far as the eye can see. In such flocks, as in their synchronized flight at a waterhole, individual birds merge into the blur of movement. This loss of individuality fulfils an important function, for aerial predators also have difficulty singling out an individual from the tightly-knit mass.

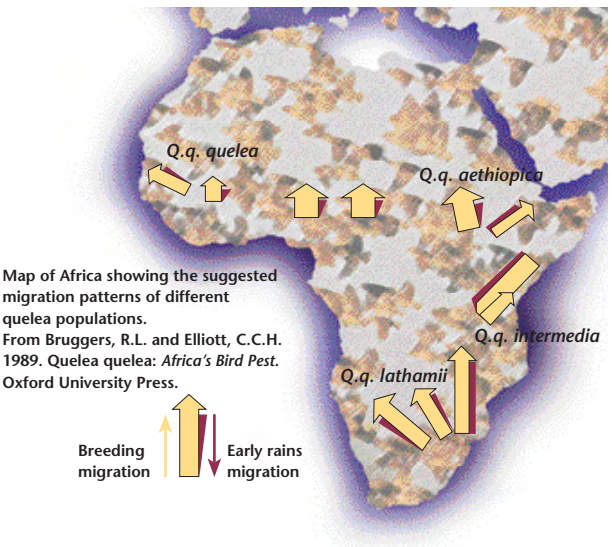
Queleas are members of the weaver family and, like several of their cousins, they are intensely social at all times. They breed in vast colonies that can number well over a million pairs. The nests are crammed together in thorn trees, or sometimes reedbeds, at a density of up to 140 000 nests per hectare. Colonies can cover an area that may range from one to over a hundred hectares, but is usually 10–20 hectares in extent. Within each colony, breeding is remarkably synchronous. The often hundreds of thousands of pairs lay their eggs within two or three days of each other. When the females remove the shells at hatching time, the falling eggshells sound like rain. After a further week, the hungry screeching of the young becomes deafening.

The chicks are fed insects, and parents feeding several million hungry and rapidly growing youngsters in a colony can deplete over half the insects within a 10-kilometre radius. Queleas nest only after good rainfall has produced a flush of new plant growth, resulting in an abundance of insects. Nonetheless, this period of plenty is short-lived and the birds breed in a race against time. The male constructs the loosely woven nest in about two days, and the female generally lays three eggs. The eggs hatch after just 9–10 days of incubation, and the chicks leave the nest at the age of 11–13 days. Their breeding is remarkably successful, with 80–90 per cent of nests fledging young, undoubtedly because their sheer numbers and synchronicity in breeding swamp the available predators. ▷

The Tawny Eagle's opportunity comes when it swoops down to catch a weak or injured bird trailing the flock.

Adult queleas feed on the seeds of annual grasses which ripen and are available in abundance several weeks after the rains. Once these seeds dry out and are shed from the plants, they fall to the ground and become hidden under the vegetation cover, making it difficult for queleas to access them until the grass cover thins out later in the dry season. Fortunately for the queleas, rainfall fronts advance slowly and predictably across different regions in Africa over a period of a few months, so that the rains begin and end at successively later dates along the track of the front. Queleas take advantage of this predictable variation in food supplies by migrating back and forth along the track of these rainfronts. They generally sit out the end of the dry season in the region with the latest rains. By the time the rains reach this region, seed will be ripening after the early rains at the other end of the rainfront track. Shortly before the rains begin in the late-rainfall region, queleas gain weight by accumulating fat to fuel their migration across the full length of the front. Although they first have to cross an intermediate zone where all seed has germinated and the grass is still growing, they arrive to an abundant food supply at the other end and soon begin breeding.

Queleas never attempt a second brood in the same colony, probably because the conditions suitable for breeding do not last long enough in one locality to support two consecutive broods. However, a proportion of females begin to develop a new clutch of eggs while they are still feeding almost fully-grown nestlings. These birds, which are capable of laying a second clutch within days of leaving the colony, undoubtedly continue their breeding migration by flying along the path of the rainfront to catch up with the zone of seeding grasses and



Map of Africa showing the suggested migration patterns of different quelea populations.
From Bruggers, R.L. and Elliott, C.C.H. 1989. Quelea quelea: *Africa's Bird Pest.* Oxford University Press.

A Marabou Stork snaps up queleas that have become waterlogged and have drowned at a waterhole under the sheer weight of numbers of birds coming in to drink.

breed again. By the time the dry season begins and their natural foods start to become scarce, quelea populations have increased several-fold after a sequence of successful breeding events through the rainy season. It is now that their conflict with man intensifies as they turn their attentions to the abundance of food in cereal croplands.

Despite having a distribution restricted to the savanna regions of Africa, the Red-billed Quelea has achieved notoriety as 'the most destructive bird pest in agriculture anywhere' and 'the most numerous bird in the world'. Originally, the total population size was put at anywhere between one and 10 billion, but the most recent estimate suggests that there are around 1 500 million (1.5 billion) queleas across Africa at the end of a typical breeding season. The quelea's status as a pest is rooted in the spectacular fashion in which dense swarms can descend like locusts on agricultural lands and destroy grain crops within a matter of days.

The local damage can be devastating, causing considerable hardship to subsistence farmers in famine-prone regions and a significant economic loss to larger, commercial farms. Consequently, farmers universally regard the quelea as a serious menace to food production, even though individual farmers suffer serious losses rather infrequently. Queleas seldom cause damage to the same local area in consecutive years. Recently, researchers have begun to question whether the 'quelea problem' has become exaggerated more as a result of farmer perception than as a genuine threat to crops. Because quelea flocks are so conspicuous, farmers blame the birds for reduced crop production, when other factors such as limited rainfall or poor farming practices may be of greater importance than the birds.

When viewed at a national level, the magnitude of the damage is placed in better context. Estimates of such damage vary wildly, partly because of the difficulties of assessment and partly because of the vested interests involved. Figures of up to US$59-million in damage per annum have been quoted for some of the more seriously affected countries in East and West Africa. However in 1989, Clive Elliott, an ornithologist working on quelea projects for the Food and Agricultural Organization (FAO) and United Nations Development Project (UNDP), estimated the continent-wide damage caused by queleas to amount to about US$22-million each year. If, for argument's sake, this damage is restricted to the 11 countries which report

The birds alight* en masse *in trees and reports exist of branches breaking under their weight.

queleas as a major pest, then the loss amounts to less than one per cent of their total quelea-vulnerable crop production.

Nonetheless, the considerable local damage that queleas do cause is difficult to overlook and over the past 40 years millions of dollars have been spent trying to contain this threat through research and lethal control. The main control method now used is aerial spraying with organophosphate pesticides (fenthion and cyanophos). In the early, exploratory days of lethal control, the measures were extreme and resulted in severe environmental contamination in many instances. In Senegal in 1956, more than five tonnes of explosives were used to destroy 27 quelea roosts and 160 000 litres of diesel were used in flamethrowers to burn 3 200 hectares of breeding colonies. In early ground-spraying operations in South Africa, dosages of 2 250 litres per hectare of organophosphate were used, while as little as seven litres per hectare now suffice for aerial spraying. Poison baits and the poisoning of waterholes with cyanide, once common practice, have largely ceased due to the indiscriminate killing of many non-target animals.

Raptors attracted to the rich pickings at quelea breeding colonies are particularly vulnerable during quelea spraying operations. The persistence of the poisons also means that secondary poisoning is common. In some of the worst individual incidents, 400 Black Kites were killed at a colony in Mali, 200 White Storks died after eating poisoned queleas in Sudan, and big reductions in raptor populations, particularly those of Tawny Eagle, Augur Buzzard, Black-shouldered Kite and Black Kite, have been reported in Kenya after ground and aerial spraying operations. Such catastrophic incidents are fortunately infrequent, but are nonetheless an ever-present danger.

Fire-bombs are finding increasing use in some countries, particularly South Africa, because of the reduced environmental side effects. Using 2 000 litres of petrol per hectare, 20-litre metal drums are spaced seven to 10 metres apart through dense quelea roosts or breeding colonies, and connected to small quantities of explosives to detonate the petrol. The bombs are set off after dark, once the birds have settled in for the night, and shoot sheets of flames throughout the colony. The cost of the fire-bomb is four times higher than that of fenthion, but it achieves a 90 per cent success rate com-

pared with 60 per cent for aerial spraying.

Lethal control operations are usually the responsibility of government agencies. The costs of control are thus borne by the state, with little or no contribution from farmers. Naturally, farmers are quick to call in the control teams. In the face of shrinking budgets, governments are finding it increasingly difficult to pay for expensive lethal control measures. There is concern, however, that should farmers be asked to contribute to the costs, or should the operations be halted completely, farmers would carry out their own, unmonitored control measures with potentially much greater environmental harm. Individual farmers are less accountable than a government agency. For example, in a bid to kill queleas, farmers in Zimbabwe are known to apply a poison designed for aphid control to the edges of wheatfields. To further complicate matters, recent research suggests that the environmental consequences of using organophosphates for quelea control are more serious than they were thought to be. Among other findings, scientists have discovered that the breakdown products of fenthion are more toxic than the original active ingredient.

In a new attempt to reconcile the conflicting demands of farmers and environmentalists, the FAO is now advocating an Integrated Pest Management (IPM) approach to the quelea problem. IPM seeks to closely involve farmers in examining alternative ways of reducing the risks of crop loss to queleas by modifying planting times, substituting crops, using bird-scaring techniques, and implementing lethal control only for birds that are directly threatening crops. This approach is unlikely to find favour with hard-nosed commercial farmers who would favour lethal control if they are not required to bear the costs, but it is thought to hold potential for reducing the losses of subsistence farmers over much of Africa. A three-year experimental implementation and evaluation of the practicalities of IPM is set to start in the Senegal River Valley between Senegal and Mauritania soon. □

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CLAUDIO VELÁSQUEZ

Victims of the huge numbers of queleas that cram into a single tree, these birds have been unable to avoid being impaled on acacia thorns.

QUELEA CONTROL IN SOUTH AFRICA

South Africa is one of the most efficient countries in the lethal control of queleas. The Agricultural Research Council is responsible for conducting research on queleas and control methods, while the Department of Agriculture carries out the control operations. Since the 1950s, a relatively constant total of 40–100 million queleas have been killed each year.

Currently, the split between the use of chemical spraying and explosions is roughly even. Following a public outcry over the use of fenthion to spray reedbed roosts along the Gariep River several years ago (fenthion is highly toxic to aquatic life, let alone the rich diversity of waterbirds that use the linear oasis of the river), it is the department's policy not to spray queleas in wetlands. Only queleas that are a direct threat to crops are controlled, and the rapid response times of the control teams ensure that minimal damage is caused to crops. The threat of queleas is therefore quantified as their potential to damage crops, which for the year ending March 1998 was calculated at just over R7-million for the 75 million birds killed. The operational costs of control amounted to a little over R3-million, excluding the costs of salaries, transport, research and environmental side effects.