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Managing Pigeons

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Pigeons, more accurately named rock doves (*Columba livia*), are common in cities and towns around the world. The birds thrive alongside humans as we provide them with a plentiful supply of food and nesting locations. Humans have domesticated the birds for thousands of years using them to carry messages between communities. Pigeons have been used by military forces as messenger and surveillance birds. Humans have, and still do, utilize the birds as a human food source, as racing birds, fancy birds selected for size, shape, color, and behavior, and as cherished pets.

Pigeons are sturdy birds weighing 9-14 oz as adults, with small heads and short reddish legs (Figure 1). The color of their plumage is highly variable but most are bluish-gray with beautiful iridescent throat feathers. Wing patterns vary but often have two black bands on each wing. Pigeons often have a darkly colored and rounded tail.

Biology

Pigeons originated in Africa and now have worldwide distribution. They are incredibly adaptable and tolerate a very wide range of environmental conditions. Pigeons will nest on buildings and structures with flat surfaces and ledges. Outside of urban settings pigeons nest on or in animal enclosures, barns, grain silos, bridges, and on natural rocky ledges where they can perch.

Pigeons are omnivores and will scavenge in large numbers on living vegetation, fruit, and insects. They also feed on seeds, human garbage, human and animal feed, and fecal matter. They are attracted to open areas where they find food on the ground (Figure 2) and quickly learn where resources are predictably available (Figure 3).

Figure 1. An adult pigeon. Photo: Shutterstock

Figure 2. A flock of pigeons feeding. Photo: Shutterstock

Figure 3. Pigeons feeding on food scraps in a dumpster. Photo: Shutterstock

Figure 4. Signage discouraging bird feeding. Photo: Shutterstock

In locations where pigeon populations are overwhelming notices discouraging bird feeding are common (Figure 4).

Some city governments have established ordinances that prohibit feeding pigeons.

As adults, male pigeons locate a suitable perching site and coo to gain the attention of females. Males perform a courtship dance cooing, strutting, and bowing to attract a mate. Once paired, pigeons maintain a monogamous relationship for life. The couple will select a suitable nesting site, and females construct simple flat mat nests of feathers and vegetative matter collected by the male.

After mating, females lay one to three white eggs in under two weeks (Figure 5). Both adults take turns sitting on the eggs which hatch in about 18 days. Babies are called squabs and fledge in 25-45 days depending on weather conditions. Pigeons will create one or two nests and reuse them throughout their lifetime. The birds breed year round, rearing multiple broods each year for several years.

Female pigeons mature between five and seven months of age. Although pet pigeons can live over ten years, wild pigeons rarely live beyond three years.

Figure 5. Pigeons with eggs rarely leave them unattended. Photo: Shutterstock

Pigeons maintain a high degree of fidelity to nest locations and if they are involuntarily removed and released miles away, in an unfamiliar territory they will return to their original nesting site. Unfortunately, their lack of dispersal and year-round reproduction inevitably leads to a buildup of pigeons over time.

Many bird species have extraordinary navigational abilities which allow them to migrate or to return home after release in a remote, unfamiliar place. Homing pigeons have been recorded retuning from over 1,000 miles away. Pigeons fly at speeds of 50 miles per hour quite usually and are capable of short bursts at 90 miles per hour when evading predators. Therefore relocating pigeons is unlikely to result in fewer pigeons, and released pigeons will often return faster than the people returning from a release location using roadway transportation.

Our understanding of how pigeons navigate and return to home sites continues to unfold as a complex process. A number of mechanisms have been tested and found to contribute to their spatial awareness. Abilities include using the sun azimuth, magnetoreception, infrasound and atmospheric olfactory cues. Pigeons also have good color vision and while in familiar territory can navigate using familiar landmarks.

The latest findings on magnetoreception in pigeons indicates two kinds of information is gathered from the magnetic fields encompassing our globe. First, magnetically sensitive, photochemical reactions in the bird's eyes detect the direction of the Earth's magnetic field lines. Secondarily, magnetic intensity is detected by magnetite-based receptors in the bird's beak.

Pigeon pairs may live separately or in flocks comprising of tens to hundreds of birds. Flocks may have overlapping territories depending upon available food resources.

Pest Status

Pigeons are commonly considered to be pests in urban areas, even when populations are low. When nesting on or in buildings droppings build up quickly generating considerable concern for residents, property managers and owners (Figure 6).

Fecal deposits look unsightly, rendering outdoor furniture unusable (Figures 6, 7, and 8). Droppings can damage property, discoloring exterior surfaces, car paint, and wood. Additionally, droppings and nesting materials clog pipes and gutters, damage electrical systems, reduce solar panel efficiency (Figures 9), and attract secondary pests including ectoparasitic mites and insects. They also attract urban nesting birds of prey like the peregrine falcon, common kestrel, red-tailed hawk, and Cooper's hawk.

Figure 6. Pigeons nesting on an apartment balcony. Photo: D. H. Gouge, University of Arizona

Figure 7. Pigeon droppings cover a balcony chair. Photo: D. H. Gouge, University of Arizona

Figure 8. Pigeons and droppings on a park bench. Photo: Shutterstock

Figure 9. Pigeon droppings on solar panels, which reduces efficiency. Photo: Shutterstock

There are health risks associated with pigeon droppings which are of greatest concern to people who have a weakened immune system. This includes those with HIV / AIDS, cancer and transplant patients who are taking immunosuppressive drugs, and those with inherited diseases that affect the immune system. The risk of developing severe disease depends on each person's degree of immune suppression.

While there have been dozens of disease-causing pathogens isolated from pigeons and their droppings, for most healthy people the disease risk following contact with a pigeon, nesting material, or droppings is considered to be low. However, rare illness reports associated with pigeon exposure include fungal, bacterial and viral pathogens.

Histoplasmosis is a respiratory disease caused by the *Histoplasma capsulatum* fungus which grows in soil, dried bird droppings and bat guano. Spores are light and if disturbed become airborne and can be inhaled. This disease

is far more common in high humidity regions of the U.S. and tropical regions of the world. High water level, acidic, nutrient rich soil supports fungal growth. In unfavorable conditions like arid desert areas histoplasmosis is primarily a disease of the immunocompromised or spelunker/caving enthusiasts exposed to spores from bat guano.

Cryptococcosis is a respiratory and nervous system disease caused by inhaling *Cryptococcus* fungi associated with bird droppings. Healthy people do not usually become infected even if exposed to high levels of the fungus.

Cutaneous candidiasis is a fungal skin infection more commonly associated with in-home pet birds or poultry rearing facilities. Occasionally pigeon fanciers experience symptoms after direct contact with infected birds or contaminated surfaces.

Psittacosis (also called chlamydiosis and parrot fever) is a bacterial infection caused by inhaling *Chlamydia psittaci*. The flu-like symptoms include a dry cough, fever, headache, muscle aches, chills and sometimes pneumonia. Symptoms usually develop 7-14 days after exposure. Those at greatest risk are bird owners, pet shop and poultry rearing staff, people who cleanout bird infestations including nesting materials and droppings, veterinarians and people with compromised immune systems.

Bird flu (Influenza A viruses like H5N1) remains a health concern for people handling and working around live birds. Pigeons are considered to be a low risk species as they are typically resistant to avian influenza infection. However, in research studies pigeons have been infected under laboratory conditions. While there are few documented natural infections, pigeons should be considered a potential host for new variants or emerging novel avian viruses. But currently, pigeons are not significant amplifiers of avian influenza viruses and a person can **not** contract bird flu from bird droppings.

Acute febrile illness and neurologic disease is caused by a number of mosquito-borne flaviviruses. Wild bird populations influence illnesses caused by mosquito-borne viruses like St. Louis encephalitis virus and West Nile virus. Birds are the primary hosts which amplify these viruses in nature. Mosquitoes feeding on sick birds can potentially transmit the viruses to humans at a later point. Pigeons are significant amplifiers of St. Louis encephalitis virus, but so far have proven to be poor hosts for the West Nile virus. Neither virus can be acquired from exposure to birds or bird droppings directly.

Serious health impacts can result from the consumption of water and food contaminated with pigeon droppings. Pigeons will forage on animal feces and are attracted to concentrated animal farming operations and farm facilities in general because of easy access to food and water resources

Figure 10. Pigeons feeding on manure and straw bedding removed from horse stables. Photo: Shutterstock

(Figure 10). Pigeons are considered to be important reservoirs of the Shiga toxin-producing bacterium *Escherichia coli* 0157:H7 strains which can cause serious human illness and cause severe damage to the lining of intestines and kidneys.

Additionally, pigeons are capable of carrying and disseminating parasites like *Toxoplasma gondii* and *Cryptosporidium*. Both protozoan parasites cause illnesses in people and other animals.

Clean-up

When cleaning up bird droppings, avoid stirring up dried fecal matter and inhaling it. Common activities, such as cleaning pigeon droppings from windowsills, guttering, and external features (Figure 11) will not usually result in a high-risk exposure. However, precautions must be taken to reduce risk and those with compromised immunity should avoid clean-up duties altogether.

Important: Do not scrape, power spray, sweep or vacuum dry fecal matter or nesting materials. Disturbing contaminated areas can cause spores and fecal fragments to become airborne.

If cleaning outdoor areas with small fresh deposits of droppings wear disposable gloves, an N95 respirator, and wash clothing upon returning home.

Carefully wet down external areas with water and clean gently with disposable washcloths or mop heads.

Being in enclosed areas with droppings increases the risk of inhaling airborne pathogens.

Cleaning areas where fecal build-up and nesting materials are significant is a job for professionals.

Professionals are trained to assess risks and use the appropriate Personal Protective Equipment (PPE) in these situations. This will include rubber boots, disposable gloves, disposable coveralls, and a respirator.

Respiratory protection can involve the use of an N95 filtering facepiece **and** additional eye protection, or a full facepiece air-purifying respirator or powered air-purifying respirator. **Respirators should always be worn when working around bird, rodent, or bat droppings and nesting materials.**

Droppings and nesting materials can be carefully removed using disposable towels. Areas may require treatment with a disinfectant that will not damage substrate surfaces. The use of a disinfectant will necessitate following the specific directions provided on the product label including waiting for specific dwell times to pass. Finally, areas should be moped or sponged with clean water.

All bird waste, used cleaning materials and contaminated PPE should be double-bagged and disposed of in an external dumpster.

Figure 11. Pigeons nesting on school bell. Photo: Shutterstock

Managing Pigeons

Pigeons are very adaptable and an integrated pest management (IPM) approach is required to keep populations at a low level. Many techniques are effective in the short-term. But establishing a long-term, area-wide program is an ideal goal. There are very few effective long-term options for individual homes or buildings.

Figure 12. Pigeon perching on a window air conditioner. Photo: Gurpartap Singh, Macaulay Library at the Cornell Lab of Ornithology

From a practical standpoint pigeon management actions center on: exclusion, repellency from areas and resources, and population reduction. While minimizing food, water, perching (Figure 12) and nesting opportunities renders a location less attractive to pigeons, those tactics are often overlooked in favor of immediately reducing populations. However, trapping and releasing, or using lethal population reduction often results in a rapid rebounding of the populations.

Exclusion involves blocking access to roosting and nesting areas. Birds can be excluded from lofts, steeples, vents, and eaves using exclusion mesh. Bird netting necessitates expert installation and maintenance to avoid the capture and killing of native birds. Roosting on ledges can be discouraged by changing the angle of a ledge to 45° or blocking access (Figure 13).

Figure 13. Roosting opportunity (left) and after pest-proofing measures are taken (right). Photos: Dawn H. Gouge, University of Arizona

Figure 14. Well-placed bird spikes prevent pigeons from landing. Photo: Shutterstock

Figure 15. Well-placed bird wire is almost invisible and prevents pigeons from landing. Photo: Standard Pest Management, Astoria, NY

Pigeons can also be deterred from perching and loafing on some structures by installing bird spikes (Figure 14), wires (Figure 15), or other deterrents.

However, installing bird wires and spikes is a job for professionals as deterrent selections and correct installation will impact success. If bird spikes are installed inappropriately or incorrectly they can actually generate nesting opportunities for native bird species or pigeons themselves (Figure 16).

Figure 16. Not all perching places can be spiked successfully. Here a native dove is nesting behind bird spikes which have generated a nesting opportunity for a different bird species (left) and pigeons (right). Photos: Dawn H. Gouge, University of Arizona

Figure 17. Reduce access to food resources by improving waste management. Photos: Shutterstock

Exclusion from food resources (Figures 17) often includes modifying waste management practices.

Repelling, deterring, or frightening pigeons away from areas is an option for those trying to avoid structural changes to buildings. There are a variety of visual, chemical, sonic, mechanical and electromagnetic measures available to deter pigeons. However, some may provide only temporary reductions in birds as pigeons habituate to sights and sounds relatively quickly (Figures 18 and 19).

Models of owls, hawks, snakes, and cats vary in effectiveness depending how realistic they are and how often they are relocated to new locations.

Light reflectors and lasers are similarly effective for varying amounts of time depending upon positioning and the pigeons ability to habituate to spinning light reflectors (Figure 19).

Figure 18. Models of predators are not usually effective for very long. Photo: Doug Bruner, University Termite and Pest Control Inc.

Figure 19. A pigeon used to a light reflector (left) and hanging CD light reflectors (right) do deter pigeons for a while. Photos: DaveFliesDrones.com (left) Shutterstock (right)

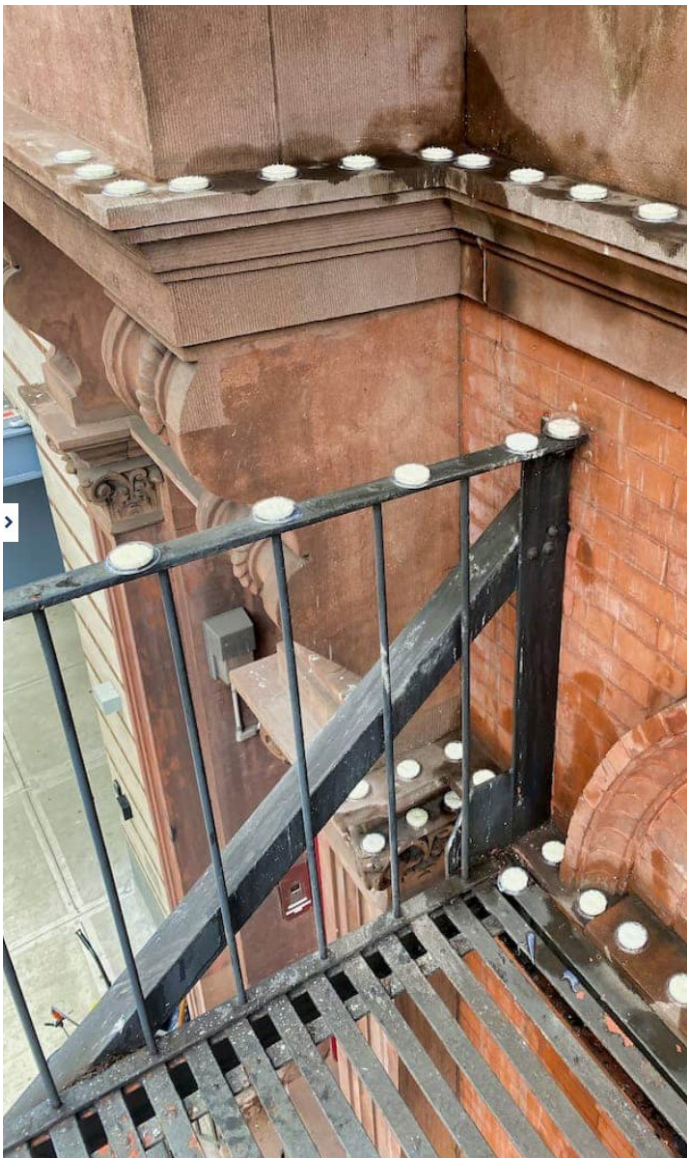

Figure 20. Optical gel deterrent which reflects ultraviolet light and has a sticky surface. Photo: Standard Pest Management, Astoria, NY

The efficacy of laser-based repellant systems depends upon the laser power, beam type, wavelength, and light conditions. Unfortunately, few efficacy tests have been undertaken.

Sticky optical gel repellents (Figure 20) reflect ultraviolet light and have a tacky surface, both of which deter pigeons from landing on structures. Humans can detect light between the wavelengths of 760 (red limit) to 380 (violet limit) nm. Nevertheless, many animals are sensitive to a larger range of the electromagnetic spectrum. Pigeons detect light further into the ultraviolet range showing the highest sensitivity between 360 and 325 nm which is outside the human visual range. However, gels tested by researchers showed transient repellency and the use of sticky surfaces as a deterrent generates animal welfare concerns and can impact non-target species (Stock and Haag-Wackernagel, 2014).

Sticky substances made from polybutene polymers discourage pigeons and other birds from landing on treated surfaces. Unfortunately the substance adheres to feathers or fur of any animal which makes contact with it, and the substances can be particularly harmful to smaller bird species.

Chemical repellents come in several forms and work in different ways. An automated, time-release aerosol repellent that releases vaporized methyl anthranilate is registered to deter birds. Methyl anthranilate is found in grapes and many other plants and is a registered avian feeding repellent. It has mainly been used in the U.S. to protect crops from foraging birds. Anthranilates stimulate the trigeminal nerve which is part of the nervous system responsible for sending pain, touch and temperature sensations from the head to the brain. The chemical triggers nerves in a bird's beak, eyes, and throat resulting in pain after detecting the vapor or tasting the substance on food. Anthranilates are phytotoxic to some plants.

Anthraquinone can be extracted from tomatoes and several other plants and is registered for use in the U.S. as a bird repellent for use at U.S. airports. When eaten it causes nonlethal digestive upset that deters ongoing feeding.

4-Aminopyridine is sold as an avian frightening agent, however death of both target and non-target species is reported. The active ingredient is a potassium channel nerve blocker that causes seizures in birds and mammals. Although there have been use restrictions added to label directions accidental exposures still occur, especially in dogs (McLean and Khan, 2013). The active ingredient is deployed as a bait in treated corn, corn pieces, and mixed grains attractive to many animals.

Audible noise-making devices can be disturbing to people and although firecrackers and other pyrotechnics are effective initially, birds habituate to sounds in time.

Ultrasonic devices emit sound frequencies inaudible to humans who hear sounds in the frequency range 20 hertz to 20 kilohertz. The upper limit of frequencies heard by pigeons is about 11.5 kilohertz, so ultrasonic devices can **not** be heard by pigeons. Research testing of devices has shown no effect on pigeon behavior (Jenni-Eiermann, Heynen, Schaub, 2014). But the devices can affect non-target animals able to hear higher sound frequencies.

Electric shock bird deterrent systems are also available for repelling pigeons from perching areas (Figure 21).

Shock tracks are designed to be painful but not lethal, but generate significant animal welfare concerns. Units can be connected to the mains or powered by solar panels.

Most shock tracks consist of two wires that run parallel to each other embedded in flexible track. One wire carries

Figure 21. Electric shock track placed along ledges of buildings will prevent birds from landing. Photo: Standard Pest Management, Astoria, NY

current from a power box and the other wire is earthed. If an animal comes in contact with both wires the animal experiences an electric shock. The live wire is usually installed on the outer edge of a ledge and power boxes deliver between a 4500 and 9000 volt shock. Research tests indicate that shocked pigeons are deterred from landing, but the theory that a few shocked birds emit panic sounds that deter flocks has not been established scientifically (Seamans and Blackwell, 2011).

An electromagnetic pulse device that emits a 120 hertz pulse has been shown to disorient pigeons flying in the vicinity and prevents birds landing on buildings (McReynolds, unpublished data). The device consists of a thin wire wrapped around the perimeter of a building (Figure 22). A system trialed on homes with long-term pigeon populations showed strong repellency. Pigeons were monitored using wildlife cameras, and live counts. There was a significant reduction in pigeons loafing on the building while the device was turned on (Figure 23). However, birds quickly returned once the device was turned off. No lethal or injurious effects on pigeons or other birds in the area were observed.

Figure 22. Electromagnetic pulse wire around a building perimeter. Photo: DaveFliesDrones.com

Figure 23. Electromagnetic pulse device turned off (top) and on (bottom). Photos: C. McReynolds, University of Arizona

Holland (2010) tested the effects of a strong magnetic pulse designed to alter the magnetic sense of passerine birds. The researcher demonstrated that disruption of the iron-mineral-based magnetic sense affects songbird behavior. Additionally, researchers have documented the negation of repellency effects when a local anesthetic is administered to the beaks of birds, providing circumstantial evidence that the iron-mineral-based deposits in the beak play a role in magnetic field sense (Wiltschko et al. 2009).

Population control is often attempted directly. Shooting birds is an inappropriate and unacceptable method of pigeon control in most situations for obvious reasons.

Live-trap and release while effective in removing adult birds initially, usually only results in very short-term reductions in numbers as pigeons find their way back home. Live-trapping necessitates frequent trap checks to remove captured pigeons, and local codes and ordinances should be checked as this may not be an allowable method. Additionally, the removal of nests and destruction of eggs has little long-term effect on the population unless nest and egg removal is conducted regularly and exhaustively. As soon as the activities are halted the population rebounds.

Pigeons breed rapidly. Assuming two eggs per clutch, six clutches in a year, offspring reaching maturity at six months, no mortality within 2 years, and half the offspring are female, just one mated pair can produce 78 offspring in a just two years.

Figure 24. OvoControl® P nicarbazin bait dispenser. Photo: Standard Pest Management, Astoria, NY

Reducing egg hatch is a strategy that has increased in popularity in a number of industrial, commercial and public areas. **Nicarbazin** is registered as a bait (OvoControl®) that prevents eggs from hatching and must be broadcast to allow birds to feed daily. Automatic wildlife feeders (Figure 24) are programmed to dispense bait daily or the bait can be broadcast by hand. Automatic dispensers are often located on a flat rooftop or other area close to loafing pigeons. Pigeon pairs will continue to tend eggs that never hatch for significant periods of time, and females fail to lay additional clutches while they continue to feed on nicarbazin bait.

Nicarbazin interferes with the formation of the vitelline membrane which separates the egg yolk and egg white. The effect on development and hatchability is a function of time and dose, and the effect is reversible if the bait is no longer accessed by the bird. Eggs from birds feeding on nicarbazin bait daily generally do not hatch and label instructions minimize nontarget species.

However, field studies have shown population reductions in some instances (Albonetti et al. 2015) as well as some failures (Senar et al. 2020). Undoubtedly success can be achieved given distinct flocks feeding daily on nicarbazin bait. But in complex city settings with plentiful food choices, populations may not be reduced reliably unless an area-wide effort is undertaken.

Oiling, shaking or piercing eggs in an early developmental stage is considered a humane way of preventing eggs from developing and hatching.

Egg oiling involves coating the egg shells with oil such as liquid paraffin, mineral, or vegetable oil. This stops air from passing through the shell to the embryo and prevents development and hatching. While this method is highly effective, it requires the location and treatment of all eggs, some of which may not be accessible.

The use of dovecotes and pigeon lofts as part of pigeon management programs is increasing in popularity in some regions. The idea is to provide a housing structure in which pigeons are encouraged to nest and newly laid eggs are accessible. The eggs can be removed and dummy eggs substituted, or eggs can be treated so they do not develop.

Key Pest Management Considerations

A single flock of pigeons can range from tens to hundreds of birds. A flock may nest and roost (Figure 25) in one location, feed at another (Figure 26), fly (Figure 27), and/or loaf (hangout) (Figure 28) at yet another location.

Figure 25. Pigeon parent and Squab. Photo: Shutterstock

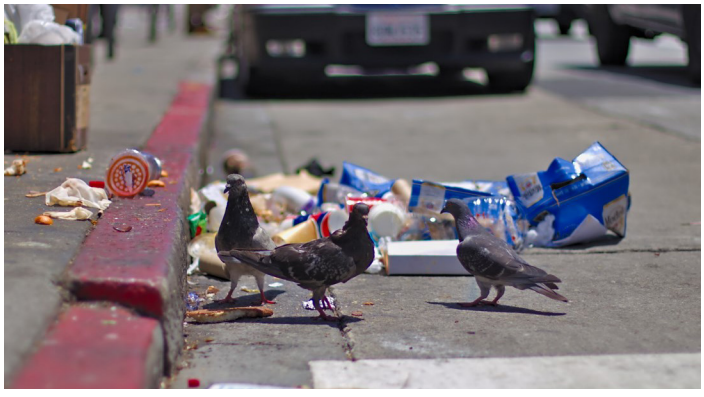

Figure 26. Pigeons feeding. Photo: Shutterstock

Figure 27. Pigeons flying. Photo: Francisco Pires, Macaulay Library at the Cornell Lab of Ornithology

Figure 28. Loafing pigeons. Photo: Marjorie Watson, Macaulay Library at the Cornell Lab of Ornithology

Since pigeons use multiple locations for different purposes, roosting and nesting locations may be several miles from their regular feeding and loafing areas. Pigeon flocks will often share food resources with unrelated flocks but tend to be more defensive over nesting and roosting (sleeping) areas.

Important: Removal of a flock using lethal means only provides temporary relief as new flocks will establish in favorable habitat.

Discrete flocks are generally easier to manage than multiple flocks with overlaping resources. But in every situation management of pigeons is a complex challenge requiring an integrated approach. Wherever possible, a combination of local outreach, reducing access to resources, exclusion from perching and nesting areas, and long-term population control using non-lethal means generates the best success.

Acceptable pigeon management strategies have become increasingly humane, with greater consideration for animal welfare, ecological considerations and sustainability. We have a shared history living alongside these amazing animals and can continue to do so through the use of integrative management measures.

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