

Controlling Birds at Aquaculture Facilities

The open-water areas and large concentrations of fish at aquaculture facilities appear to be a virtual smorgasbord for wildlife that eat fish. Most mammals are either large enough that they can be easily excluded or small enough that they do not pose an economic threat to the facility. Birds are more difficult to exclude and can have a significant economic impact if no control methods are used.

General Biology

Reducing damage by fish-eating birds requires accurate bird identification and some knowledge of avian biology and habits. Responsible bird management means knowing both the problem species and other birds that use the aquatic habitat without harming aquaculture efforts. Not all birds harm production. Birds become a problem only if their activities directly or indirectly result in a significant loss of fish. The following birds have been implicated in some level of damage at Pennsylvania aquaculture facilities. It is important to identify problem species accurately. Field guides to birds are available at local libraries and bookstores.

Great blue herons

Great blue herons both reside in and migrate out of Pennsylvania. Because of their large body size, great blue herons can consume large quantities of fish each day. They seem to prefer fish over 7 inches long but will continue to forage in areas where the fish are no longer of the preferred length. They feed on fish by stalking them and striking with their beaks. Great blue herons are widely distributed across the state. They nest in colonies known as rookeries.

Green herons

The green heron, formerly known as the green-backed heron, is Pennsylvania's most abundant and widespread wader. It is a small, chunky heron named for its greenish black crown feathers. The green heron prefers forested margins of streams, ponds, and lakes. Although fish make up a large percentage of its diet, it also consumes insects and crustaceans. Green herons like areas that have hunting perches, such as partly submerged logs and low overhanging branches.

Egrets

Both the great egret and the snowy egret are visitors to Pennsylvania during the spring and late summer. These species nest in colonies in the state's southeastern corner, where they are prone to disturbance by human activities. The great egret is a state-threatened species with only a few localized colonies in Pennsylvania. The snowy egret occurs sporadically in southeastern Pennsylvania. It prefers crayfish and fish, while the great egret likes fish and small vertebrates. The snowy egret actively pursues prey by using its yellow feet to lure in its victims. The great egret forages alone and in groups where it walks slowly in shallow water.

Black-crowned night herons

The black-crowned night heron is stocky, with a short neck and legs. The male has a black crown and back with white hindneck plumes. This species can be found feeding on fish and crustaceans at night. The birds frequently eat crayfish, although fish make up a large part of their diet. Black-crowned night herons hunt for prey by standing still and grabbing nearby fish. Although they



used to be found throughout Pennsylvania, they now are most often found nesting in colonies in the lower Susquehanna Valley. As is true of most wetland nesting species, population declines have occurred in the past century.

Yellow-crowned night herons

The yellow-crowned night heron can be distinguished from the black-crowned night heron by the male's buff-white cap. When immature, this species is commonly confused with the black-crowned night heron, which more often is found in association with aquaculture facilities. Although yellow-crowned night herons specialize in crustaceans, they also eat fish. They can be seen feeding in shallow water at night. To catch their prey, yellow-crowned night herons stand in the water and either remove crustaceans from the bottom or catch nearby fish. They nest in only six small colonies on the Susquehanna River and on Conestoga Creek in Lancaster and Dauphin counties. Because of the small number of nesting sites, this species is extremely vulnerable to human disturbance. The yellow-crowned night heron is a state-threatened species.

Mallards

Mallards are abundant throughout Pennsylvania. They can be found near bodies of water of any size and, in many cases, are year-round residents. Although they predominantly consume vegetative matter and aquatic invertebrates, they have been known to eat fingerlings under 6 inches in length. Mallards are dabbling ducks, which means they feed by skimming the surface of the water or by tipping forward to submerge their heads and necks to feed in the shallows.

Ospreys

Ospreys are endangered at the state level. Because of their low numbers, they have been reintroduced into many areas of Pennsylvania. Ospreys consume both live and dead fish. Owing to their endangered status, harassment and lethal methods of control are not legal.

Belted kingfishers

Belted kingfishers eat mostly fish. They can be seen sitting on overhead wires or branches while foraging for food. When feeding, kingfishers observe their prey from an overhead perch and dive to catch it. Kingfishers are common throughout the state. They nest in streambanks and vigorously defend their territories. When you see a kingfisher on a property, that bird and its mate are probably the only ones in the surrounding area.

American crows

The American crow often is overlooked as a fish-eating species. It tends to eat fish over 7 inches long. Crows are common throughout Pennsylvania. They are one of only a few species that are unprotected when causing damage.

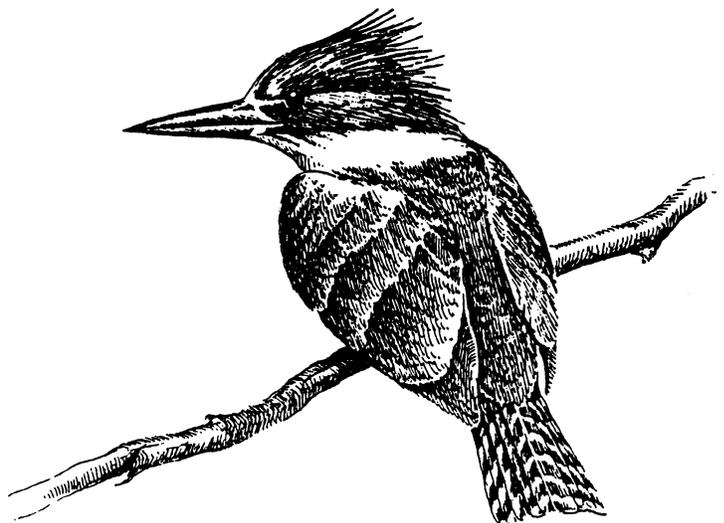
Common grackles

Common grackles can be found in all areas of Pennsylvania. They frequent many habitat types but most commonly are found in association with humans. Grackles eat a mixture of seeds, grain, invertebrates, and fish; occasionally they can be found wading in shallow water for food. After most of the fish in a raceway, or other container, have grown to over 6 inches, grackles will move to other areas. It is legal to control grackle populations on your property without a depredation permit if they are causing damage.

Damage Identification

Many fish-eating birds are highly mobile and adaptable predators, rapidly able to exploit situations of food abundance. Aquaculture facilities are ideal feeding sites for these predators. The severity of bird problems will vary with the species and number of birds present and whether the birds reside only seasonally or tend to remain at the facility throughout the year. The proximity of nesting or roosting sites and the availability of alternative feeding sites also are important factors.

Because most species of fish-eating birds are diurnal, or active during daylight hours, direct observation is the usual means of confirming bird presence and damage. Obvious signs of hunting and feeding include birds perched on trees or wires near raceways or ponds, hovering overhead and then plunging into the water, standing or stalking along the edges of ponds, or swimming and diving in ponds. Some species, such as the black-crowned night heron, feed at dusk and during the night. Additional observations at night should be made to verify bird depredation. Some fish may show scars from predatory attempts. Herons sometimes spear but do not kill or eat larger brood stock. Chewed or partly eaten fish may be a sign of predatory mammals, including raccoon and mink.



Belted kingfisher

Legal Status and Permit Process

Solving bird depredation problems is complicated. All migratory birds are protected by federal law, and game birds in the state are under the jurisdiction of the Pennsylvania Game Commission. The only birds not protected by either federal or state law are pigeons, house sparrows, and European starlings. There is an exception to this overall regulation. Certain species of blackbirds, crows, and grackles are not protected when they cause damage to an aquaculture facility.

Because of the economic loss birds cause, a grower's first reaction often includes taking lethal action. Lethal control, however, is not allowed without a permit. Permits to use limited lethal action against depredating birds may be granted, but only after nonlethal techniques have been used correctly, and after qualified USDA-APHIS Wildlife Services personnel verify that nonlethal methods need to be reinforced by use of lethal methods. A permit is not needed to physically or mechanically exclude any fish-eating bird. A permit is not required to harass or scare birds, except for threatened or endangered species.

A permit is required if protected birds are to be harmed by damage control techniques. The Migratory Bird Depredation Permit can be obtained from the U.S. Fish and Wildlife Service (FWS). Pennsylvania is in Region 5 of the FWS, and the permit application must be sent to the Region 5 headquarters in Hadley, MA. A copy of the permit application can be obtained from the Pennsylvania office of USDA-APHIS Wildlife Services (P.O. Box 459, Summerdale, PA 17093; 717-728-0400). Wildlife Services can help with the permit process as well as distribute information and loan damage control materials.

After the permit has been sent to FWS, a copy is forwarded to Wildlife Services. Wildlife Services then inspects the property for which the permit is being requested and recommends action to the FWS. They also consult the local Pennsylvania Game Commission wildlife conservation officer. The recommendations are then sent back to FWS, which in turn sends the permit to the game commission's Bureau of Law Enforcement. The game commission must co-sign the permit before it becomes legal. If both the game commission and the FWS agree that the permit should be issued, the permit is sent to the grower.

Damage Control

With the exception of total exclusion, single control methods rarely solve a bird control problem. Results obtained from nonexclusion techniques may vary. Keep in mind that all methods succeed or fail to some degree, and a combination of methods is usually required. The choice of control methods is determined by a number of factors, including the species of birds involved, the extent of the damage, the projected cost of the control program, the type of facility to be protected, the species of fish grown, the size of the water impoundments, and the

long-term effect on facility management.

Finally, economics plays a role in the selection process. Although methods such as exclusion are initially costly, the long-term economic benefits usually outweigh the costs. Other methods are less costly initially but do not provide the long-term benefits.

Facility Location

The physical location, design, and construction of an aquaculture facility influence the susceptibility of fish to bird predation. Although water availability, water quality, and other parameters essential to fish production are prime considerations in selecting a site, locations away from obvious bird concentrations also should be considered. Establishing facilities in close proximity to rivers, roosting areas, marshes, and other wetlands will increase interactions with bird populations.

Fish Management

Fish management and the ability to adjust programs based on changing bird habits are important. Since fingerlings are more susceptible to bird predation, they should be located close to the center of human activity and near buildings that might be incorporated into a bird exclusion system. Larger fish usually need less protection because they are better able to avoid predators.

Feeding techniques also may influence the effectiveness of bird management programs. Floating rations produce surface feeding activity among fish that aids the grower in monitoring fish health, but this activity also may attract birds that consume the floating food and feeding fish. The advantages of using floating rations should be weighed against the problems they may cause.

Exclusion

Exclusion is the complete enclosure (caging) of ponds or raceways with screens or nets. It is effective for small facilities but impractical for most ponds larger than five acres.

Total exclusion is the only available method that provides complete, long-term control. Complete screening or netting is effective in excluding all problem birds. Some commercial producers have adopted complete facility enclosure or partial enclosure in combination with other management practices.

The Pennsylvania Fish and Boat Commission has an ongoing program of excluding birds from their fish hatcheries. Before initiating the bird control program, the commission estimated statewide losses of over half a million dollars per year due to bird depredation. Over a period of 7 years, the Fish and Boat Commission enclosed 11 hatcheries at a total cost of nearly one million dollars. Although exclusion was costly at first, current losses are minimal and the economic savings have far exceeded the costs.

Which barrier system to choose depends on the problem bird species and the expected duration of damage, size of facility, and whether the barrier will

interfere with other operations. Other considerations include possible damage from severe weather and the barrier's effect on site aesthetics in visually sensitive areas. Any physical barrier control system must be constructed so that it does not become lethal to birds. Make the barrier visible to birds so there is minimal accidental entrapment and/or injury. Avoid using loosely hung, small mesh netting.

Impediments

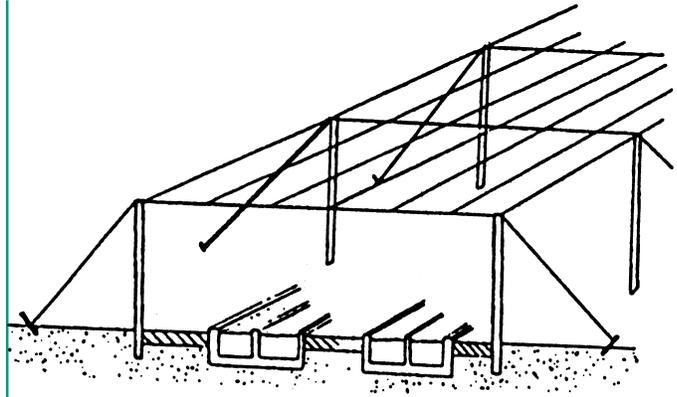
Impediments are partly covered systems with overhead wires, lines, nets, or screens, and devices that discourage birds from entering a feeding zone or perching nearby. Impediments such as overhead lines are usually less expensive than enclosures, but they do not exclude all bird species. For example, properly spaced overhead wires or lines can deter most gulls effectively, but screening or netting is required for smaller birds, such as kingfishers or birds that land beside and then walk into impoundments.

Overhead Wires or Lines—Ponds or raceways can be covered with overhead lines of braided or other extruded polypropylene material, or stainless steel wire, suspended horizontally in one direction or in a crossing pattern. These lines should be made visible to birds by hanging streamers or other objects at intervals along the wires. The objective is to discourage bird feeding activities and not to cause bird injury or death. Overhead wire networks generally require little maintenance other than maintaining proper wire tension and replacing an occasional broken wire. Reflecting tapes also are used in overhead networks, but they are prone to wind damage.

Metal Spines—For some situations sharp, metal spines, sometimes called porcupine wires (Nixalite® and Cat Claws®) may be used to keep birds from perching and roosting on structures near the water. Homemade versions can be built by hammering nails through wood lath and attaching the lath at the appropriate location. Poles or posts may be guarded against perching birds by sharpening the end, by inserting a guard spike, or by using a sheetmetal cone over the end. These devices are useful for discouraging species that hunt from an elevated perch; they also are useful at roosting sites where fecal deposits are unacceptable.

Frightening

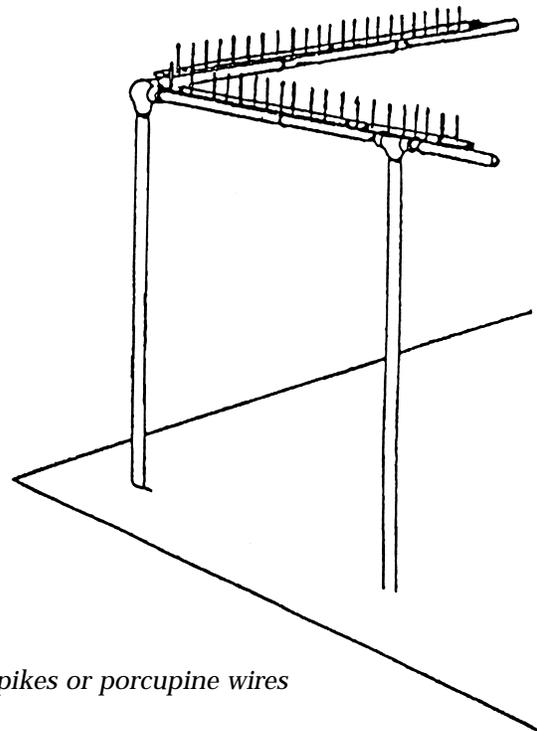
Start the frightening regime before birds establish regular feeding patterns at a site. Once regular habits are established, they are difficult to break using frightening techniques. Although at first most birds may be scared away by frightening, some soon will ignore the control methods. These "hard-to-scare" individuals attract others to the feeding site. Such birds require a control method involving real danger from the bird's point of view, such as pyrotechnics or exploders, reinforced by human presence. The effectiveness of frightening devices can be improved by incorporating the use of rifles or shotguns to remove birds (with a permit) that have habituated.



Overhead wires or lines

Because of all the variables involved, the frightening program's success depends on the operator's skill and motivation. Frightening devices will not be effective unless used aggressively in a carefully planned program. Patrol teams can be used to harass and frighten birds in the immediate area of larger aquaculture facilities. Patrols must be adequately equipped with radio-equipped vehicles, bird distress calls, shotguns, live ammunition, and pyrotechnics. Patrol personnel must be trained in bird identification and dispersal methods.

Frightening devices can be used along with cultural methods to drive depredating birds from the area. Choosing the most effective combination of frightening devices requires careful consideration. One must match the devices to the bird species causing damage, assess the cost of equipment and labor requirements, and consider possible interference with aquaculture operations.



Spikes or porcupine wires

Automatic Exploder—An automatic exploder resembles a small cannon. It commonly operates on propane gas or acetylene and emits loud, explosive blasts at adjustable time intervals. While the number of exploders necessary will vary from site to site, one exploder can usually cover three to five acres if used properly and reinforced with other control techniques. Explosion frequency is important since short intervals increase the chance that birds will become accustomed to the sound. Timers that automatically start and stop the operation to produce irregular explosion intervals, and rotary mounts that change the direction of the sound after each explosion, improve the device's effectiveness. For best results, move exploders every one to two days to a different part of the facility. If necessary, elevate them to prevent foliage or adjacent equipment from interfering with sound projection. Exploders have been effective for herons, egrets, and blackbirds.

Pyrotechnic Devices—Harassment of birds can be accomplished by firing shellcrackers from a 12-gauge shotgun. These shells contain a firecracker that is projected 50 to 100 yards before exploding. Since wads from the shell may stick in the gun, you should check the barrel after each shot and clean the gun regularly. Breech opening, open-bore shotguns are required. Possession and use of pyrotechnics may require a permit from the local, county, and/or state fire marshal.

Alarm or Distress Calls—Many species of birds emit calls that communicate alarm or distress to other birds of the same species. Broadcasted recordings of these calls can frighten and repel some bird species. Reaction to the calls varies with the species, location, size of area, and time of year. For best results, broadcast distress calls as birds begin to arrive. A timing device can be used to play calls at predetermined intervals. Lengthen the time between broadcast intervals as much as possible while still achieving the desired response. Birds get accustomed to distress calls if they are played frequently or over a long period in the same location. Thus, calls need to be reinforced by other methods. Alarm calls have been used successfully with black-crowned night herons and blackbirds.

Lights—A variety of lights, including strobe, barricade, and revolving units, have been used with mixed results to frighten birds. Of these, strobe lights similar to those used on aircraft are most effective in frightening night-feeding birds. These extremely bright flashing lights have a blinding effect, causing confusion that reduces a bird's ability to catch fish. Black-crowned night herons, however, may avoid the bright glare by landing with their backs to the lights or by moving to less well-lit areas. Avoidance may be minimized by increasing the number of lights to cover the unprotected areas.

Water Spray Devices—Water spray from rotating sprinklers placed at strategic locations in or around ponds or raceways will repel certain birds. Individual birds may become accustomed to the spray and may feed among the sprinklers. Best results are achieved when sufficient

water pressure is used and sprinklers are operated on an on-off cycle. The sudden startup noise also helps to frighten the birds.

Effigies and Scarecrows—Scarecrows and other human and animal effigies have had limited success in deterring birds. Pop-up models and models that show activity and produce a sound have been somewhat successful with herons, ducks, and cormorants, but all require frequent relocation.

Chemical Frightening Agents—Avitrol® is registered for use on herring gulls and blackbirds. For herring gulls, Avitrol® is applied to a bread bait; for blackbirds, several grain formulations are available (corn, sorghum, wheat, and mixed grains). The bait is lethal to the bird ingesting it, and the afflicted bird's erratic behavior and distress and alarm calls will frighten away other birds in the flock. Mortality is minimized by limiting the amount of bait offered. State and federal permits are required for using Avitrol®.

Lethal Methods

It is illegal to trap or shoot all of the fish-eating birds described in this fact sheet (except blackbirds, crows, and grackles), without a Migratory Bird Depredation Permit from the U.S. Fish and Wildlife Service. A permit (see "Legal Status and Permit Process") is issued only to augment nonlethal methods. Waterfowl may be legally hunted during the hunting season. A hunting license and federal and state duck stamps are required. Check Pennsylvania hunting regulations and local ordinances before discharging firearms near buildings or roads.

Summary

Birds can cause serious monetary damage to aquaculture facilities. Consequently, it is in the grower's best interest to take necessary precautions to minimize the likelihood that birds will become a problem. First, when selecting a site for an aquaculture facility, avoid areas near known concentrations of fish-eating birds. Second, when designing a facility, design it so that total exclusion is possible over at least most of the ponds and raceways. Third, if birds do become a problem, identify the species causing the damage and use control methods effective for that particular species. Consult USDA-APHIS Wildlife Services personnel to determine which control techniques will work best.

Finally, start control programs early, before birds are a major problem, use a variety of techniques, and be persistent. Lethal methods should only be used as a last resort, and permits are required before lethal methods are begun.

Materials and Suppliers

The following are suppliers of control products. You can buy some of these products in garden supply stores, feed mills, and department stores. If products are unavailable locally, they can probably be ordered from the following companies. A more complete list of suppliers is available from USDA-APHIS Wildlife Services (for address see "Legal Status and Permit Process"). Local laws may regulate the use of some tools and techniques and should be consulted before control activities are begun.

Reed-Joseph
P.O. Box 894
Greenville, MS 38702
(601) 335-5822 or (800) 647-5554
Fax: (601) 335-8850
<http://www.reedjoseph.com/>
(distress calls, cannons, exploders)

Signal Broadcasting Co.
2314 Broadway St.
Denver, CO 80205
(303) 295-0479
(bird distress calls)

Av-Alarm Corp.
Eugene, OR
(503) 342-1271
(electronic noise and sound systems)

Rid-A-Bird, Inc.
P.O. Box 436
Wilton, IA 52778
(319) 732-3970
(scare-eye, other scare devices)

Bird-X
300 North Elizabeth
Chicago, IL 60607
(800) 662-5021
Fax: (312) 226-2480
<http://www.bird-x.com/>
(plastic owls and hawks, other bird control products)

Ecopic Corporation
725 South Adams, Suite 270
Birmingham, MI 48009
(810) 647-0505
(810) 647-7811
<http://www.ecopic.com/ecobird.html>
(predator balloons, mechanical perch repellents)

Wildlife Control Technology
2501 N. Sunnyside, No.103
Fresno, CA 93727
(209) 294-0262
Fax: (209) 294-0632
<http://www.wildlife-control.com/>
(netting)

Avitrol Corporation
7644 East 46th Street
Tulsa, OK 74145
(800) 633-5069
Fax: (918) 622-2527
<http://www.einco.com/>
(chemical frightening agents)

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