Bird Pests

Introduction

This section contains methods and procedures to control depredating and/or nuisance birds and is a guide for agricultural commissioners' personnel and others engaged in this work.

Strict adherence to recognized methods is necessary if effective control is to be safely achieved. Bird control can be effective only if proper observations are made and bird behavior is understood.

Bird problems are usually controlled by trapping, exclusion, the use of noisemakers or scare devices, the use of repellents, or the use of toxic baits. Each of these methods has a place in bird control and each problem must be evaluated to determine the best method or combination of methods to solve the problem.

Limited bird control baits are available. Toxic bait should be used only when damage is extensive enough to warrant more drastic steps than the use of other methods or when it has been determined that the use of noisemakers, scare devices, traps, repellents, or exclusion cannot do an adequate job of control. Prebaiting with nontoxic baits must be done before toxic baits are exposed. If good acceptance of the prebait occurs, most of the toxic bait will be consumed by the birds during a 24-hour period. If good acceptance of prebait does not occur, toxic bait should not be exposed. In common usage, toxic baits are not applied directly to crops. Bait should not be applied in any manner that will cause the bait to lodge in feed or food crops.

Safety Precautions

Proper handling and use of avicides is essential for safe and effective bird control.

1. Toxic baits and concentrates shall be stored in an adequately locked space at all times when not in use. Such space shall be entirely separate from where food or drink for humans or domestic animals is kept or stored.

2. All bags, sacks, or other containers should have the word "POISON" stenciled or printed directly on package. This is in addition to the normal labeling requirements.

3. All persons handling toxic baits or concentrates must be aware of:

    - The characteristics of these materials.
    - The necessity of using adequate protective clothing and devices.
    - The necessity of keeping all skin abrasions and cuts adequately protected.
    - The possibility of inadvertent poisoning of wildlife and domestic animals by improper

bait exposure.

- The symptoms of poisoning in humans and recommended first aid if such symptoms occur.

4. Toxic bait accidentally spilled should be immediately and thoroughly cleaned up.
5. Do not leave containers or prepared bait unattended, or where it can be obtained by children, irresponsible persons, or animals.
6. Unused bait should be disposed of according to the label instructions.
7. Dispose of empty bait containers according to label directions (check local regulations).
8. Wash hands with soap and water after handling poison baits and before eating or smoking.

Guidelines for Baiting Depredating Birds (Few baits are available)

Pre-Treatment

1. Actual damage or threat of damage to crops must be determined by investigation and a decision made that damage is or is likely to be sufficient to warrant more drastic steps than deterrent or repellent methods commonly available.

2. Agricultural regulatory agencies will participate in control of birds, with treated bait materials, only if such control can be conducted under the supervision of a Department field representative or of the local county agricultural commissioner.

3. There shall be adherence to officially recognized methods and techniques.

4. Baiting shall not be done unless tests indicate satisfactory bait acceptance occurs in areas to be treated.

5. Bait should be chosen on the basis of selectivity as well as acceptance value.

6. When county agricultural commissioners anticipate control programs involving other than established practices, the California Department of Food and Agriculture, Integrated Pest Control Branch, should be advised.

Treatment

1. The county agricultural commissioner or his staff should be aware of the conditions at the site of application and in a position to direct and control the manner in which the application is made.

2. Toxic baits shall not be used on crop depredating birds except where the agricultural commissioner determines that such toxic bait may be used safely.

3. There shall be adherence to laws and regulations governing protected and migratory bird species.

4. Quantities of toxic bait exposed shall be regulated so that residual bait will not present a hazard to nontarget species.

5. Property owners or tenants shall be advised to dispose of bird carcasses on the ground immediately adjacent to inhabited areas.

6. All accidentally spilled grain bait shall be cleaned up immediately.

7. Discarded or used containers shall be disposed of in accordance with California laws and regulations pertaining to disposal of pesticide containers.

Post-Treatment

1. There shall be follow-up observations in the treatment area. Written evaluation should be made of representative areas describing the type and amount of damage, the degree of control and any

observed effects on nontarget wildlife.

2. Records shall be kept of the work done and a summary included in the monthly report filed with the California Department of Food and Agriculture.

3. County agricultural commissioners shall make reports to the Secretary of the Interior as required by Section 21.44(b), Part 21, Subpart D, Chapter 1, Title 50, of the U.S. Code of Federal Regulations.

4. Any injury caused by control methods to persons, livestock, or wildlife shall be reported to the Director immediately.

Bird Control Tools

Acoustical Sound

Acoustical sounds are used to frighten birds. Sound generators produce a multitude of electronically synthesized sounds from screeches to warbles to the sound of a shotgun blast. These sounds frighten birds and interfere with their inter-flock communications. Most birds can be repelled initially by some form of acoustical sound but will soon become accustomed to these noises.

Propane Exploders

One of the most widely used sound devices for minimizing agricultural bird depredations are automatic propane exploders. These devices have been in use since 1926 when they were used to discourage deer depredations in the Rocky Mountain States.

These units normally explode with a sound significantly greater than that of a 12-gauge shotgun blast. Some units can be adjusted so that intensity of the sound can be varied. This is useful in small areas or for semi-urban situations to cause less disturbance to neighbors. The size of the actual area that can be protected varies considerably depending upon type of crop, shape and topography of the field and the border vegetation. While optimistic estimations of up to 40 acres per unit are given, one unit will usually protect about 10 acres. The use of multiple units together is usually better than the results from a single unit.

For most efficient results, the exploder should be placed on a stand so that the barrel points out over the crop to be protected. The units should be moved around every three to four days to prevent the birds from becoming habituated to the sound. Placing the exploder on a revolving stand so that after each discharge the concussion pushes the muzzle in another direction can help overcome this problem. A revolving stand can be made by mounting the exploder on one end of a 2 x 12 x 48 inch plank, the center of which is bolted through a roller bearing to the base. The weight of the exploder must be carefully counterbalanced on the other end of the plank so the unit will swing freely. Commercial stands are also available. In particularly difficult situations such as large acreages of fruit trees, the unit can be mounted on the top of a pickup truck and detonated manually as the driver moves through the orchard.

The units should be operating in the fields before damage starts. The machines must be programmed to produce explosions at the first appearance of the birds for the day and continue to operate until they have left for the night. Photo-electric cells or a mechanical clock mechanism can be used to automatically start and stop the exploders. Units working at night are not considered effective and will often disturb neighbors.

Explosions should be timed to occur every three to five minutes. Exploders are most effective when they are supplemented with other methods such as biosonics, shell crackers, bird bombs®, bird whistlers®, or shooting.

Bird Control Shells

Long-range harassment of birds can be accomplished by firing shell crackers (which contain a firecracker instead of pellets) from a 12-gauge shotgun. The firecracker is projected a distance of 50 to 100 yards before exploding. (The gun should be fired from the hip to protect the eyes.) Since wads from some shells may stick in the gun, it is best to use a single-shot or double-barrel gun which is "broken" to load, so that the operator can inspect the inside of the barrels after each round.

Bird bombs®, bird whistlers®, and racket bombs® are fired from a 6 mm flare pistol. Bird bombs® are firecrackers that travel about 75 feet before exploding. They should be used similarly to the exploding shotgun shell cracker. Bird whistlers® are similar to bird bombs®, but do not explode. They produce a noticeable trail of smoke as well as a whistling sound. Racket bombs® make noise in flight but do not explode.

Shooting

Shooting shotguns with live ammunition is more effective when used in combination with shell crackers, bird bombs®, or bird whistlers® in some situations a shotgun or 22-caliber rifle is effective in removing individual birds.

Biosonic Sound

Biosonic sound is the recorded distress or alarm calls of an individual species of bird. The species specific call is amplified and played back through a loud speaker. Birds that hear their recorded species alarm call quickly respond by departing the area. However, not all species have a distress or alarm call. More effective results are obtained if the alarm and distress calls are reinforced with other stimuli such as the use of shooting, propane exploders, shell crackers or bird bombs®, bird whistlers®, and racket bombs®.

Ultrasonic Sound

Ultrasonic sound cannot be heard by humans. Generally, birds normally do not respond to ultrasonic sound to a significant degree.

Habitat Manipulation

Thinning roost vegetation, thereby making it less attractive to birds, often produces longer term results than using scaring devices. When feasible the roost vegetation should be thinned to discourage bird repopulation after a dispersal program. Vegetation thinning, however, is not a permanent solution. In a few years the vegetation will again become dense and provide an attractive roosting habitat.

Human Effigies

Human effigies or scarecrows have taken various forms throughout the history of agriculture. Scarecrows can be elaborate, simple, made of inflatable plastic, straw stuffed overalls and very imaginative such as the Scary-Man® which combines an inflatable human effigy with high pitched wailing sounds that is activated randomly.

Metal Projectors

Porcupine wires (Nixolite® and Cat Claw®) are a permanent type of mechanical repellent. They are made of stainless steel or plastic prongs with various types of sharp points extending outward at all angles. The prongs are fastened to a solid base which can be installed on window sills, ledges, eaves, roof peaks, or areas where birds roost. The sharp pointed wires inflict temporary discomfort and cause birds to avoid landing on these surfaces. Some birds have covered the sharp projections with litter, feathers, etc. and have been able to roost or nest directly on these devices.

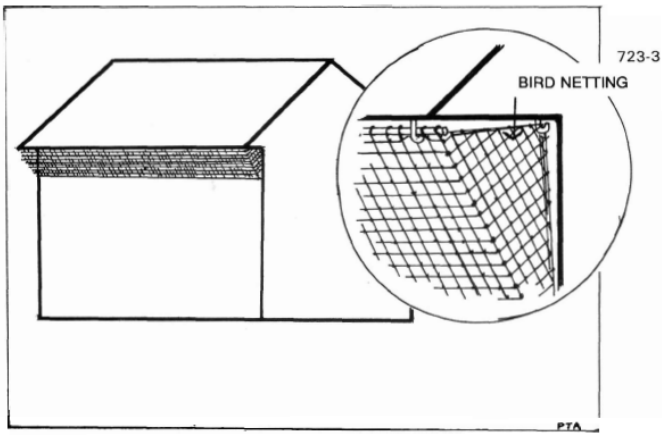
Overhead Wires

Great Blue Herons, gulls, terns, and mergansers have been excluded from fish hatchery ponds by wires suspended horizontally in one direction above the pond. Seven or nine gauge galvanized wire or high tensile strength, stainless steel wire on a support framework of two to four inch galvanized pipe are used. The spacing between wires may be 4 feet for gulls, 2 feet for terns and mergansers and 1 foot for Great Blue Herons.

With overhead access prevented, some bird species will enter from the sides. Herons do this readily whereas gulls often do not. When side entry is a problem, curtains of netting that extend from the ground to the overhead wires should be used.

Protective Netting

Lightweight plastic netting is often used to exclude birds from large spaces or openings, and to protect crops from bird depredations. In some cases a framework is necessary to support the netting. Some growers have been able to use the same netting for as many as five consecutive seasons when properly stored and cared for.



Raptor Forms

Raptor-mimicking kites suspended from helium-filled balloons have been used to scare birds from crops. Their effectiveness is enhanced when they are used in conjunction with other scare devices such as recorded alarm and distress calls, propane exploders, and exploding shells.

Reflective Tape

Reflective tape attached in areas where birds are causing damage can be effective in keeping birds away. The tape, whether plain Mylar® or colored reflective tape can be mounted to trees, on stakes, fences, or other items such as irrigation sprinkler heads and allowed to fly in the breeze. The tape reflects light and causes the birds to become uneasy and leave the area.

Lights

Area, strobe, barricade, and revolving lights are used to keep night-feeding birds away from fish rearing facilities. The type of light, and number of units, and their location are dictated by the size of area to be protected and the power source available.

Tactile Substances

Several companies (Hot Foot America, Tanglefoot, Alco Products) produce sticky gels or sprays which can be applied to bird perching or roosting sites by caulking gun or brush. These tactile gels foul the bird's feathers and feet and cause them to avoid these sites. Debris and dust rapidly decrease the efficacy of these gels, and re-application is necessary to effect control. Wood surfaces may be permanently stained by the

oils in these products, so care should be taken in their application. These repellent materials are pesticides and the label must specify this as an approved use.

Trapping

The use of traps for capturing depredating birds can be an important tool in reducing crop damage. Trapping is usually quite selective and nontarget species caught can be released unharmed.

General Considerations

Any trapping program, to be successful, must be planned to fit existing conditions. The method must take into account the species to be trapped, its habits, food preferences, population size, wariness, etc. Each species varies greatly in its "catchability" with different traps and different baits. Construction and manpower to service traps can be quite expensive. Vandalism may be high and is a factor to consider in establishing trap sites.

Legal Requirements

Both federal and state regulations apply to trapping many species of birds. Special permits may be required. Anyone anticipating a trapping program should have full knowledge of the regulations involved. (See "Legal Status" section for each bird species.)

Trap Operations

Trap Placement

A trap must be set up in the proper location if optimum results are to be achieved. Observations should be made to determine flyways and resting, perching, or feeding areas before traps are placed in operation. Traps are usually most effective when placed in the open along a flyway and a short distance from a perching or feeding area.

Trap baiting

Effective baits may be food on which the birds are already feeding. Large amounts of bait placed inside of trap with a small amount outside near trap entrances have proven most effective.

Decoy birds

The use of live decoy birds of the species being trapped is usually essential in attracting birds. One to five live decoys should be used, depending on the size of the trap. Up to 15 decoys may be required for larger traps such as a converted cotton trailer trap.

Food and water must be kept in the trap at all times, and shade must be provided to make it more attractive to birds and to keep decoys and captured birds alive.

Perches

Perches are desirable in most traps, especially larger ones. Perches provide a place for the birds to roost and should run the full length of the trap halfway between the top and the bottom of the trap. They should be located about one foot from the sides of the trap.

Shelter

Cold winds or hot sun can cause distress to trapped birds. In winter the trap can be placed in the lee of

shelter, if available, and if it does not make the trap too inconspicuous. Shade must be provided, especially during the hot summer months.

Disposing of birds

When using a small trap, the captured birds may be removed by hand. With traps large enough for you to walk inside (modified Australian crow traps or converted cotton trailer trap) birds may be removed from the trap by catching them with the hands or a small net. Larger numbers of birds may be removed from the trap by cutting a small exit hole (about 6 x 6 inches) that is easily opened and closed, in an upper corner of the rear of the trap. With the exit hole opened, a small holding cage is placed on the outside of the trap over the exit hole and the birds herded from the trap into the holding cage. The exit hole is then closed and the holding cage removed. The holding cage may be covered with a plastic sheet or placed in a barrel or box. Carbon dioxide is then injected through a hose attached to a CO_2 bottle. Dispose of dead birds by burying or in plastic bags in the trash.

Mist Nets

Mist nets are used primarily by bird banders and others engaged in the study of bird populations and migrations. However, mist nets can be a means of reducing a limited population of depredating birds and may be particularly helpful in obtaining decoy birds for use in conventional traps.

Mist nets are usually made of fine nylon strands woven into a net of various meshes (1 to 4 inches). Nets are usually seven feet high and eighteen to one-hundred feet long and when in use are suspended between poles. Strands of the net are very fine or are colored to match the background. Birds fly into the nets and become entangled in the loose folds. Nets are set up by stretching them across such places as natural flyways or at the edge of a pond. Birds taken should be removed as soon as possible but never longer than one hour after capture. The use of nets is restricted by Section 3005 of the California Fish and Game Code. Dispose of trapped birds by CO_2 euthanasia.

BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

American Coot

Fulica americana

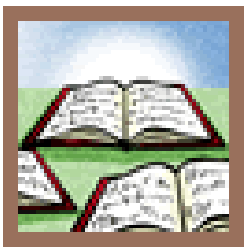
Family: Rallidae

Introduction: The American coot (*Fulica americana*) is found in wetlands and open water. They breed in marshes from southern Canada to the Pacific coast, and as far south as the northern portions of South America. Coots nest in well-concealed locations in tall reeds. They are frequently seen swimming in open water. They migrate from northern locations to the southern United States; however, they are often year-round residents where water remains open in winter. Their call is a high-pitched squeaking honk somewhat like a goose but hollower sounding.

Identification: Usually about 16 inches in length and weighing 1.4 pounds, adults have a short thick white bill and white frontal shield, with a reddish-brown spot near the base of the bill between the eyes. The body is grey with the head and neck darker than the rest of the body. Their legs are yellowish, with scalloped toes rather than webbed feet. Their chicks have black bodies with bright red head and beak, and orange plumes around the neck. Further information including is available at:

Cornell Lab of Ornithology

The Royal Society for the Protection of Birds



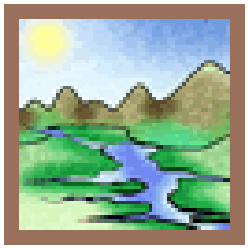
Legal Status: Coots are classified as migratory game birds in the U.S. Code of

Federal Regulations. They may be controlled under permit from the U.S. Fish and Wildlife Service. Notification of California Fish and Game is advised. No federal permit is required to scare or harass depredating waterfowl, except threatened or endangered waterfowl (i.e. Aleutian Canada goose).

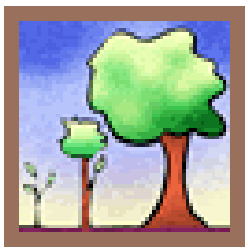
Damage: Alfalfa, oats, peppers, tomatoes, beets, beans, barley, rice, wild rice, peas, clover, livestock feedlots, natural pastures, and turf; deterioration of water quality through fecal contamination; denuding of vegetation next to natural or man-made ponds or lakes.

Range: Coots are found year-round throughout California. During winter when most damage occurs, coot numbers within the state increase significantly from Pacific flyway migrants.

American Coot



Habitat: Ponds, lakes, salt marshes, bays, and urban or suburban man-made or natural ponds, with a preference for shallow bodies of water.

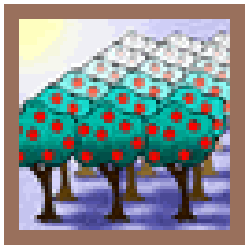


Biology: During winter, coots are highly gregarious and, as waterfowl, are outnumbered only by mallards and pintails. Coots primarily consume aquatic plants mostly at the surface but can dive up to 25 feet. If aquatic vegetation is scarce or lacking, coot flocks may wander, often far, grazing like domestic geese, pulling up seedlings and clipping grass. They puddle and trample vegetation and turf in areas

near water. They may consume grain set out for migrating ducks. Coots seasonally eat animal food, mollusks, insects, etc., when present, and opportunistically take bread, popcorn, fruit cores, fish bait, etc., in handouts.

During the breeding season from April through September, coots become solitary and vigorously defend their nesting territory. Coots prefer shallow waters for nesting; a floating nest of reeds or grass is anchored to cattails or bulrushes, or placed deep in reeds to prevent drifting.

Clutch size averages eight to twelve, usually ten, spotted or buff-colored eggs. Chicks are precocial and both adults share parental duties.



Damage Prevention and Control Methods

Frightening devices: Frightening devices are sometimes effective at discouraging coots from landing in crops. It is important to have the sound units ready before the damage begins. The fields should be closely watched during the morning and evening hours when the birds feed. A combination of two or more sound devices is often needed to alleviate the damage. The units should be mounted on stands or telescoping tripod towers above the crop so the sound is dispersed over a wide area.

Shooting: Sometimes is useful if allowed by the depredation permit. Shotguns can be relatively cost effective and efficient manner when coots are damaging crops. When coots inhabit bodies of water at recreational facilities or near human habitation, safety and public sentiment often discourages or eliminates shooting as a control option.

Cannon Nets: Cannon nets have been used with limited success to capture coots. The birds are pre-baited in front of the net with bread or chicken scratch for several days. The net is thrown over the feeding birds by rockets attached to one side of the net. The other side of the net is anchored to the ground.

Trapping: Funnel traps have been successfully used in capturing coots. Cereal grain or bread bait is spread heavily in the funnel entrance. Bait trails should run out about 100 feet from the entrance. The operator enters the trap through the funnel and herds the birds into a holding pen. The coots are normally removed from the portable trap with a dip net through the top.

REFERENCES AND ADDITIONAL READING

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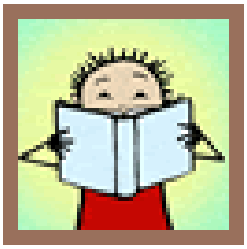
BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

American Crow

Corvus brachyrhynchos

Family: Corvidae

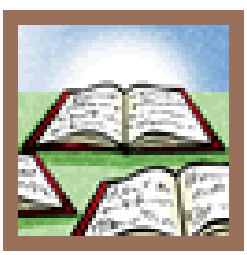


Introduction: The American crow is one of the most troublesome birds to agriculture in California. In particular, they cause considerable damage to nut crops including almonds and pistachios (Salmon 2004). Control is traditionally done using pyrotechnics, bird distress calls, shooting, or effigy hanging. It is recommended that an integrated pest management approach using a combination of methods be taken to solve crow issues. Recently, crows have attracted much public attention because of their association with the West Nile Virus disease (McLean 2004).

Identification: The American crow is a large black bird that is fairly easy to identify. It has a distinctive and loud *caw caw caw* sound which people easily recognize. Crows also have the ability to imitate some animal and human sounds. They are very adaptable and can be found in almost every habitat where trees or other roosting sites are nearby. The crow's diet is varied and includes almost everything from garbage scraps, waste grain, fruit, carrion, and small animals including the nestlings and eggs of smaller birds. During their breeding season they can be seen in pairs. In winter they often gather in large flocks, sometimes in excess of over 100,000 birds. When spring approaches, these large flocks tend to dissipate, forming much smaller breeding bands. Noted for mobbing hawks and owls, a flock of crows in pursuit of a raptor can be heard at distances of up to one mile. Further information is available at:

Cornell Lab of Ornithology

The Royal Society for the Protection of Birds



Legal Status: American crows are classified as migratory non-game birds in the U.S. Code of Federal Regulations. As such, they are protected from indiscriminate

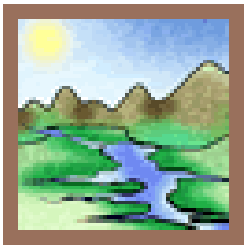
control.

California Fish and Game regulations allow American crows to be taken only by landowners or tenants, or by persons authorized in writing by such landowners or tenants, when crows are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance. Persons authorized by landowners or tenants to take American crows must keep the written authorization in their possession at all times when taking, transporting or possessing the crows. American crows may be taken only on the lands where depredations are occurring or where they constitute a health hazard or nuisance. American crows may be taken by firearm, bow and arrow, falconry, or by toxicants registered by the California Department of Pesticide Regulation for the specific purpose of taking depredating crows. Toxicants can be used for taking crows only under the supervision of employees or officers of the Department of Food and Agriculture or federal or county pest control officers or employees acting in their official capacities and possessing a qualified applicator certificate issued by the California Department of Pesticide Regulation. Such toxicants must be applied according to label directions.

Damage: Walnuts, almonds, pistachios, other nuts; grain, grapes, apricots, pears, prunes, and other fruits; green corn, cantaloupes, beans, tomatoes, peas, young poultry and eggs. They have also been known to strip bark from young citrus trees. Crows are a major nuisance in urban areas where they pull out and feed on trash, harass joggers and picnickers, and create unsightly and potentially unhealthy messes from their droppings.

Range: Even though crows are classified as migratory birds, many are permanent residents in California. Their numbers may increase in local areas due to movements from other areas including from out of state.

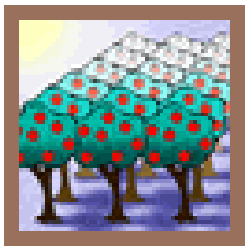
American Crow



Habitat: Forests, farmlands, river-bottoms, shores, parklands, urban areas. Crows sometimes select urban roosting sites after the breeding season and through the winter period.

Biology: Crows are intelligent and wary birds and have adapted well to man's activities. Their diet is estimated to average 30 percent animal matter, mostly insects but also including carrion, mice, and other small vertebrates; the remaining 70 percent consists of plant material such as corn, small grains, wild seeds, wild and cultivated fruits and nuts, and acorns. Human trash is also a significant source of diet in urban areas where crows are present. Nest building begins in late February to

early May. The stick nests are solitary and are almost always built in trees. Three to eight eggs are laid; incubation lasts 18 days. Age at first flight is four to five weeks. Often there is a period of several days when the baby birds are hopping on the ground but are unable to fly. As soon as the young are able to fly freely, they begin to roam about the neighborhood feeding in small family bands. As the summer progresses, families of crows join together into flocks of varying sizes. The band establishes a central roost from which it disperses over rather consistent routes each day to feeding areas up to 20 miles away. The roost location may change as the season progresses. Crows' hearing is less sensitive than humans and they cannot hear ultrasound less than > 20,000Hz (Beason 2004).



Damage Prevention and Control Methods

Exclusion: Exclusion is an effective method of reducing or eliminating bird damage in the garden or ornamental setting. However, in large agricultural settings it can become cost prohibitive. Purchase lightweight ¾ inch plastic mesh netting. This can be suspended over berry vines or small tress to protect the fruit from bird damage. Frames can be constructed from plastic pipe or wood to support the netting above seedbeds so as not to interfere with plant growth. Arches made from concrete or pliable wood can also be used to support netting. To improve efficacy, make sure netting reaches ground and is tied tightly or stretched taut. Loose netting can entangle birds or allow them to push and gain access to the protected material. Metal wire mesh or aviary row caps (picture) can also be effective in protecting seedlings. Inverted plastic strawberry baskets can also serve this purpose but they must be secured to the ground.

Netting can also resolve problems associated with birds that loaf, roost, or nest on buildings. An entire roof can be netted by stretching the netting taut 1 foot or so above the roof. Netting (¾ inch mesh) can also be used to exclude under eaves, rafters, or inner courtyards.

Other methods to exclude include bird projections, spike like devices that are permanently secured along ledges to prevent birds from landing or nesting. Electric shocking devices are more expensive but may work in limited situations. Only UL approved electrical devices should be use. Homemade shocking devices can be extremely dangerous and should not be used. Crows are smart and can often figure out how to deal with all types of protectors.

Habitat Modification: Little can be done to modify habitat to discourage crows. In some situations thinning large shade trees may discourage nighttime roosting. It may also make the site less desirable for nesting.

Frightening Devices: Propane cannons or exploders, alarm and distress calls, shell crackers, bird bombs®, and bird whistlers® are used in dispersing crows from crops. These devices should be used as soon as the birds appear; delays will make frightening more difficult. No one technique is usually effective. A combination of two or more different sounds is often needed to move the birds out of the crop. Alone, acoustic devices may be ineffective. Use Integrated Pest Management (IPM) and combine methods (Beason 2004).

Cannons should be mounted on stands or telescoping tripod towers above the crop. The units should rotate so the sound is projected over a wide area in varying directions. Field observations before placement

will help determine where the units should be located, the number of units to use, and how often they should be moved. Remember avian hearing is less sensitive than human and birds cannot hear ultrasound > 20,000Hz (Beason 2004).

Biosonics: Biosonics are recorded distress or alarm calls used to disperse crows. The call is a tape-recorded vocalization of a crow struggling like what might occur when trying to escape from the grasp of a predator. This can be an effective method to disperse crows from summer or winter roosts. While the crows are settling into the roost trees at darkness, use a portable tape player to broadcast the alarm call under the roost tree at full volume for 30 seconds. Normally the tape is played four or five times within a five minute period. This sequence should be repeated for three successive nights. Roosts must be monitored as crows may return three to five days after the initial use of sound. Houk, Gorenzel and Salmon (2004) showed that electronic distress call repellers were successful in hazing crows in California almond orchards. Using broadcast distress calls combined with other IPM methods e.g. pyrotechnics, shooting and gas cannons resulted in damage reduction from 5 lb/ac to 1 lb/ac.

Reflective Tape: Silver color reflective tape has proven effective in dispersing crows from tree roosts. Strips of tape 5 to 20 inches long are tied at three foot intervals at the end of tree branches. The narrow appearance of the tape and the crackling noise made in the wind apparently frightens the crows. Stringing compact discs (CDs) over the area to be protected is an alternative (see illustration). Generally, these methods will not be effective unless used in combination with others. Birds quickly habituate to these devices.

Fumigants: None known and not recommended as an effective control method.

Repellents: In some situations repellents are marketed to control birds e.g. repelling geese from turf. However, most bird repellents are not registered for use on agricultural commodities such as fruit or vegetables. Repellents based on objectionable tastes, odors, or learned aversions rarely provide consistent ongoing protection. Nontoxic sticky or tacky repellents are used to discourage birds from roosting or loafing on buildings. Birds do not like the feel of these materials. However, these are not recommended for crow roosts.

Shooting: Shooting can reduce the number of birds, but is very labor intensive. Effective reduction of populations may be prevented due to the wary nature of crows. Crow calls have been used to lure crows to within shooting distance. Probably the most value from shooting comes from frightening, especially when combined with other frightening methods.

Toxic Bait: Toxic bait is available commercially (e.g. Avitrol Double Strength Whole Corn® for use in limited circumstances (Swindle 2002)). No baits are considered effective to control crows. Bait acceptance has proven extremely difficult under most California conditions.

Trapping: Trapping to control bird damage is common in both agriculture and non-crop situations. It is effective for some species but not American crows. Additionally, no data are available on the cost benefit of trapping as a control technique (Gorenzel and Salmon 2000).

Other Methods: No avian contraception materials are registered for crows. It is a nonlethal tool that can be utilized in conjunction with other management techniques to help control depredating bird populations. It is a time consuming process and each management situation is different. However, contraception may be useful in an integrated management plan to maintain a population at a given level since it is reduced

(Yodor and Miller 2006).

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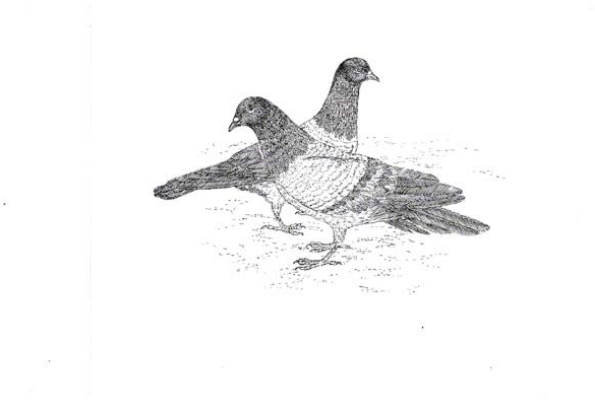
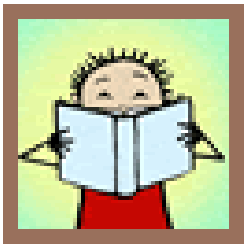
BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

Band-tailed Pigeon

Columba fasciate

Family: Columbidae



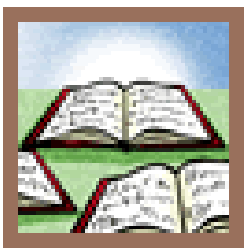


Introduction: The band-tailed pigeon is a native bird found in two distinct regions in the American West, as well as throughout Central and South America. While similar looking, it should not be confused with the rock pigeon. It is a medium size bird and relatively quiet for a pigeon.

Identification: The band-tailed pigeon has a dark overall color with a white collar on the nape. The tail is dark gray at the base and light gray across the tip. It has a purple gray head and breast with an iridescent greenish bronze patch below the white collar. Under parts are paler than the rest. Bill is yellow with a black tip. Size 13 to 16 inches, weight 12 to 13 ounces. Further information is available at:

Cornell Lab of Ornithology

The Royal Society for the Protection of Birds



Legal Status: Band-tailed pigeons are classified as migratory game birds in the U.S. Code of Federal Regulations. A depredation permit is required from the U.S. Fish and Wildlife Service before any person may take, possess or transport migratory game birds. No federal permit is required to haze or herd depredating band-tailed

pigeons.

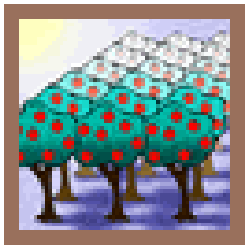
Damage: Flocks of band-tailed pigeons will damage plum and other fruit orchards by consuming the immature fruit. Extensive damage has occurred to bushberries.

Range: Common resident in hardwood and hardwood-conifer habitats, and in coniferous habitats east of the Sierra Nevada-Cascade crest. Inhabits lower slopes of major mountain ranges of the state (excluding the desert ranges); also occurs in wooded coastal zone. Especially gregarious in winter; flocks range widely in search of an abundant food source. Closely associated with oaks and acorns. Adapted locally to heavily planted residential areas where oaks are present.

Band tailed Pigeon

Habitat: It builds a simple platform nest out of twigs and lays one or two eggs that are a glossy white color. Outside the breeding season it forms flocks, sometimes over 50 birds, and often becomes nomadic, following the acorn crop or moving to lower altitudes or other areas outside its breeding range. It often visits bird feeders.

Biology: The male and female look similar, but females are duller, with narrower white crescent and less extensive iridescence. Males are slightly larger. Juveniles lack the white crescent and iridescent patch on nape. The band-tailed pigeon makes a repeated deep hooting (like an owl) and coos, rising slightly in pitch. There is a pronounced wing clap on taking flight. Diet consists of seeds, fruit, acorns, pine nuts, and flowers. It forages on the ground and in trees in small flocks, and can travel long distances to gather food.



Damage Prevention and Control Methods

Exclusion: Plastic netting has been laid over entire fields of bushberries to protect against bird depredation. The net is held in place over the crop by a series of poles and wires. The netting is draped to the ground to completely enclose the field. The

netting can be removed and stored for the following season.

Frightening Devices: Shell crackers, bird bombs®, and bird whistlers® are effective at dispersing flocks of band-tailed pigeons. Alarm or distress calls are generally not effective on these birds.

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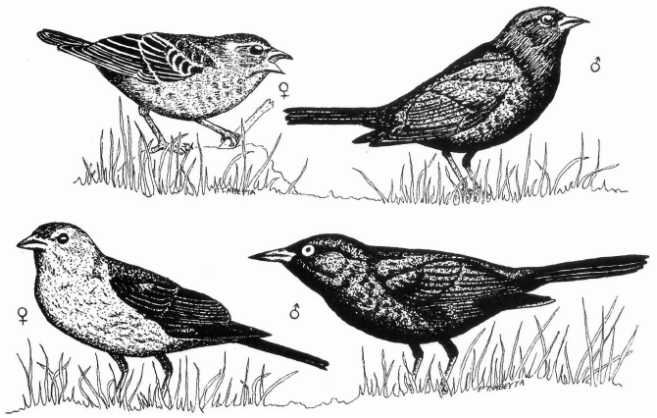
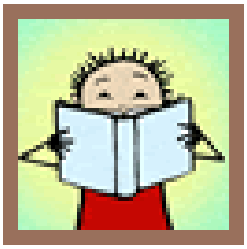
BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

Blackbirds and Cowbirds

Red-winged, *Agelaius phoeniceus,* and its subspecies
Tricolored, *Agelaius tricolor*
Yellow-headed, *Xanthocephalus xanthocephalus*
Brewer's, *Euphagus cyanocephalus*
Brown-headed Cowbird, *Molothrus ater*
Family: Icteridae



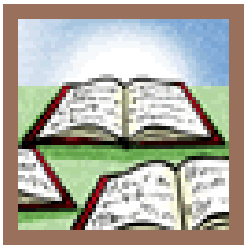


Introduction: The term blackbird loosely refers to a diverse group of 10 species sharing similar characteristics. The blackbird subfamilies share some common traits. The males are mainly black and they eat grain, seed, fruit, and insects, although diet percentages vary amongst subspecies. While all blackbirds generally feed in flocks and roost at night, they have different nesting techniques, migration patterns, and impacts on agriculture.

Identification: The five subspecies of blackbird commonly found in California are summarized below. Further information is available at:

Cornell Lab of Ornithology

The Royal Society for the Protection of Birds



Legal Status: Blackbirds and cowbirds are classed as migratory birds in the U.S. Code of Federal Regulations. These birds may be controlled without a federal

permit when they are found to be committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

Important: The tricolored blackbird (*Agelaius tricolor*) is listed as a Bird of Conservation Concern regionally and nationally, and as a California Bird Species of Special Concern. It is under status review as a candidate for possible federal listing as a threatened or endangered species.

Red-winged Blackbird

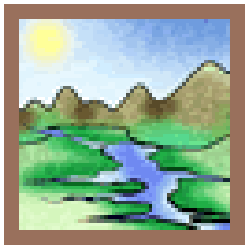
Identification: The male is a little smaller than a robin and is black with red and yellow shoulder patches. The female is smaller and brown and it resembles a large sparrow. Further information including audio is available at:

Cornell Lab of Ornithology

Damage: Grain, including: rice, wild rice, milo, oats, wheat, barley, and sweet corn; chili peppers, almonds, sunflowers, and lettuce; cattle ration consumption at cattle feedlots.

Range: Six sub-species of red-winged blackbird are known to inhabit portions of lowland California. Most of the members of these races do not migrate out of their summer range area. The *A p californicus* subspecies of the central valley is distinguished by the lack of any orange border on its Red-wing patches, but the other subspecies are not readily separated in the field. Some integration between races may occur along range boundaries. Breeding ranges of the subspecies are as follows: Sacramento and San Joaquin Valleys from Red Bluff to Visalia, *A p californicus*; northeastern California east of Sierra summit, and wintering on the Central Valleys, *A p nevadensis*; Imperial Valley and lower Colorado River Valley, *A p sonoriensis*; valley of the south fork of the Kern River, Kern County, *A. p. aciculatus*; central coastal California from Lower Lake to Soledad, *A p mailliardorum*; north coast from Mendocino County northward, *A p caurinus*; south coast from San Luis Obispo County southward, *A p neutralis*.

Red-winged Blackbird



Habitat: Primarily marshes and swamps, but also inhabits hayfields, meadows and cultivated lands.

Biology: Nesting begins in March and continues into May, usually in colonies. Four eggs are usually laid in a nest from 3 inches to 14 feet above water or ground in cattails, tules, willows, or other vegetation. Some authorities say two broods are raised each year. Incubation takes 11 to 14 days. Young birds can fly at 11 to 14 days after hatching.

Food: Insects and other small invertebrates are the major food sources in spring and summer; in fall and winter, grain and weed seeds are consumed in large amounts. Some of the grain is waste grain gleaned from harvested fields and spills, but local concentrations of red-wings may inflict heavy damage on grain crops from the milk stage onward. Shattering of grain caused by the landing and roosting of red-winged blackbirds in the crop can also lead to significant damage. Red-wings are not known to eat fruit.

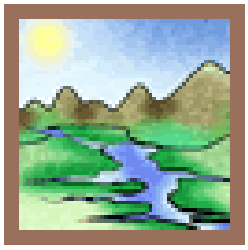
Movements: Migration out of the subspecies range is uncommon, though some southward relocation does occur. By mid-June, small family groups are feeding about the fields. By July, these groups are joining to form larger flocks, and by mid-August, some areas have become points of concentration for a large population. From then until March, their activity is a definite routine, centering first on a food supply and second on a favorable roosting location.

Tricolored Blackbird

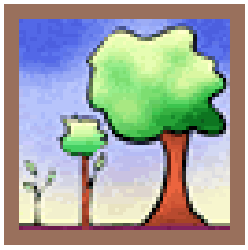
Damage: Same as red-wing blackbirds.

Range: Nests from the Klamath Lake area southward, west of the Sierra Nevada, into Baja California. It winters in its California range to Baja California.

Tricolored Blackbird



Habitat: Freshwater swamps and marshes and surrounding open areas.



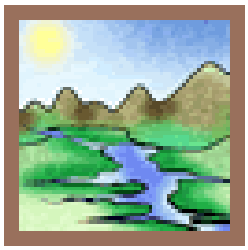
Biology: Nesting begins in March and continues into May. Three to five eggs, usually four, are laid in a nest like the red-wing's, which may be in a colony of thousands of nests. Tricolors are very gregarious. Incubation takes about 11 days, and first flight of the young occurs 10 to 13 days after hatching. Food is similar to the red-wing's, but because flocks are larger, the damage to grain is typically greater. Movements are irregular. The birds often desert the nesting location as soon as the young are able to fly. During August, flocks from the various nesting marshes begin to concentrate into areas of abundant food. The roosting location may continue as a center of activity in winter.

Yellow-headed Blackbird

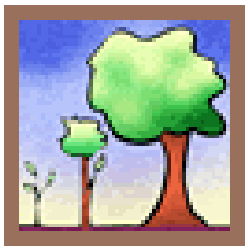
Damage: Grains.

Range: Distribution is erratic in California with the largest concentration in northeastern California.

Yellow-headed Blackbird



Habitat: Freshwater swamps and marshes and surrounding open areas.



Biology: Most yellow-headed blackbirds migrate out of the state in winter. Nesting commences following their return in mid-April. Nests are built in reeds over water 2 to 4 feet deep. Nests may be from 6 inches to 3 feet above the water and contain three to five eggs, usually four. Yellow-headed blackbirds usually nest in colonies and defend their territory against other blackbirds. Polygamy is suspected as breeding females usually outnumber males at the nesting site by about 2:1. This is probably because it takes males two years to gain their striking plumage, whereas females are ready for breeding after one year.

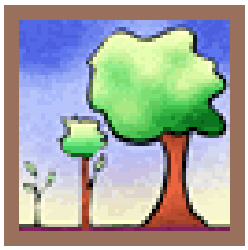
Yearling males are chased away from the nest colony by mature males and the yearlings usually settle a short distance away. Incubation takes 12 to 13 days and nestlings fly after 9 to 12 days. Food is mostly grain and weed seeds, though insects and other invertebrates make up about 33 percent of the diet. The yellow-headed blackbird is rarely found in sufficient numbers to require control measures directed against it alone. In company with red-wings, it may enter into grain fields. In such instances, it is adequately controlled by the methods used for red-wing blackbirds.

Brewer's Blackbird

Damage: Grain, fruit, lettuce, cabbage, almonds, prunes, and tomatoes; consumption of cattle ration at cattle feedlots.

Range: Common throughout California. Winters in valleys and along the coast from San Francisco southward.

Brewer's Blackbird



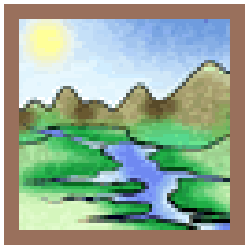
Biology: In February or March, flocks return to their breeding location where during the initial weeks the birds pair off into more or less permanent pairs; pairing may break down in the non-breeding season but is usually reestablished each spring. Occasionally polygamy occurs in the flock when the number of females exceeds the number of males. Nests are built in loose colonies on the ground or in trees at distances up to 150 feet above the ground. Three to seven eggs may be laid; usually five, and incubation lasts 12 to 14 days. Age at first flight is 13 to 14 days. If the first clutch of eggs does not survive, the pair will generally attempt a second or even third, but if the first brood is successful, there is seldom a second attempt. Food is about two-thirds vegetable matter, largely grain, with various insects and small invertebrates making up the remainder. After the nestlings can fly freely, the nesting population often joins with flocks of other blackbirds, and the entire flock may roost at their nesting sites or in other suitable places. The roosting place will often change. Part of the flock may move south in the winter. There is some evidence that winter residents contain a disproportionate number of adult males.

Brown-headed Cowbird

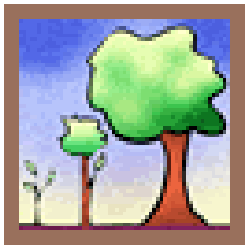
Damage: Grains and consumption of ration at cattle feedlots. Nest parasite on small native birds.

Range: Resident throughout the state. Cowbirds from northern regions over-winter in California and Mexico.

Brown-headed Cowbird

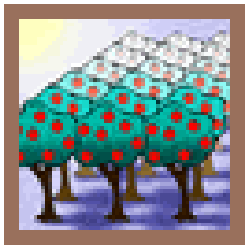


Habitat: Farmlands, forest edges, groves, and riparian woodlands.



Biology: The cowbird is a nest parasite, laying its eggs in the nest of other birds. Nationwide, 101 different species have been known to rear young cowbirds successfully, but favored species include warblers, small sparrows, and robins. Authorities differ as to the number of eggs laid in a season (Reilly, up to five; Pickett, eight to ten), but they agree that each egg is usually laid in a different nest. The cowbird egg hatches sooner than the eggs of the host, and, being older, the young cowbird often gets so much more of the food that the other nestlings do not survive.

Incubation lasts 11 to 12 days and the age of first flight is more than 19 days. Food of adult birds is more than 75 percent vegetable matter, such as seeds and grain. The cowbird is named for its common association with grazing cattle, whose movements stir up insects eaten by the cowbird. Cowbirds flock with other blackbirds to feed and are responsible for some grain damage.



Damage Prevention and Control Methods

(All Blackbirds and Cowbirds)

Exclusion: Exclusion of blackbirds from agricultural crops is practical only for small gardens, experimental plots, and high value fruit crops. Use lightweight netting to cover trees, bushes, or small plots. Protect individual ears of sweet corn in garden plots by placing paper bags over them after the silk has turned brown.

Habitat Modification: Most blackbird damage to agricultural crops occurs in fields within 5 miles of roosts. Thus, one strategy is to plant non-attractive crops—such as soybeans, wheat, potatoes, or hay—in fields within a few miles of a roost. If crops vulnerable to damage, such as corn or sunflower are planted near a roost, alternative feeding sites should be made available to reduce the feeding pressure on these cash crops. Delaying the plowing or tilling of previously harvested cropland near roosts to provide alternative feeding sites is one strategy to reduce damage to maturing crops. Also, fields near roosts should not be planted unusually early or late so that they mature in isolation from other fields in the area. In general, as alternative feeding sites decline, maturing grain or sunflower fields become more attractive to blackbirds and keeping them out becomes more difficult.

Experimental programs are underway in sunflower production areas of the northern plains to thin out dense stands of cattails in marshes where large numbers of blackbirds roost. A registered herbicide (Rodeo®) is applied in swaths to about 70 percent of the marsh. Thinning the cattail stands decreases blackbird roosts in the marsh and increases use by waterfowl for nesting and other activities.

Damage to sprouting rice fields planted near blackbird roosts in Louisiana and Texas can be substantially reduced by delaying planting until April. By this time, the large flocks of migrant blackbirds will have left for their northern nesting areas. The timing of harvest can be very important in reducing damage to fields from flocks of blackbirds. For example, redwings inflict most damage to sweet corn at the time of fresh-market harvest, when the corn enters the milk stage. Timely harvest of sweet corn can substantially reduce damage. Although field corn generally becomes unattractive to birds when the kernels mature, sunflower, sorghum, and rice continue to be attractive after they mature and, thus, should be harvested as soon as possible. Hybrids of corn with long husk extension and thick husks are more resistant to damage than other hybrids. Sorghum that contains high tannin content is also less preferred than low-tannin varieties. For sunflowers, birds prefer oil seed cultivars over the confectionery cultivars. Using sunflower cultivars with heads that turn downward as they mature and seeds with thick hulls should also help reduce feeding by blackbirds.

Frightening: The use of frightening devices can be effective in protecting crops from flocks of blackbirds. Their use also requires hard work and long hours for the farmer, who needs to be persistent and innovative to keep one step ahead of the birds. Devices need to be employed in the early morning and in late afternoon when the birds are most actively feeding. Crops such as sweet corn, which are vulnerable to blackbirds for only a few days before harvest, may not be too difficult to protect; however, the task becomes more formidable for crops such as sunflower and sorghum which may be vulnerable for up to six weeks. Propane exploders (some with timers that automatically turn them on and off each day) are the most popular frightening devices. In general, use at least one exploder for every 10 acres of crop to be

protected. Elevate exploders on a barrel, stand, or truck bed to "shoot" over the crop, and move them around the field every few days. In addition, reinforce this technique occasionally with other scare devices. Also effective are shell crackers, 12-gauge shotgun shells containing fire cracker projectiles that explode after traveling up to 150 yards. Shooting birds with a shotgun, using standard bird shot, often can kill a few birds and reinforce other scare devices. This technique, however, is usually not as effective in moving birds as the other devices that have greater range. Thus, a shotgun patrol should not be used as the sole means of frightening birds since they often just move out of range.

A variety of other bird-frightening devices, including electronic noise systems, helium-filled balloons tethered in fields, radio-controlled model planes, reflecting tapes made of Mylar, tape-recorded distress calls for birds, and various types of scarecrows are also occasionally used to rid fields of blackbirds. The effectiveness of these devices is highly variable, depending on the persistence of the operator, the skill used in employing a device, the attractiveness of the crop, the number of birds, and the availability of alternate feeding sites. As mentioned with regard to propane exploders, birds tend to adjust or adapt to frightening devices. It is usually best to use two or more devices than to rely on a single device.

Repellents: No bird repellents are currently registered for maturing grain, sunflower, or fruit crops. Several seed-treatment repellents such as Ro-pel® (active ingredient is benzyl diethyl ammonium saccharide) and Sevana Bird Repellent® (ground garlic and pepper) have been registered to reduce bird damage to freshly planted and sprouting corn and other crops. However, the registration status of these products changes continually; thus, check with your local county agricultural commissioner or USDA-APHIS-ADC biologists for products currently registered. Up to date information is available at the California Department of Pesticide Regulation website.

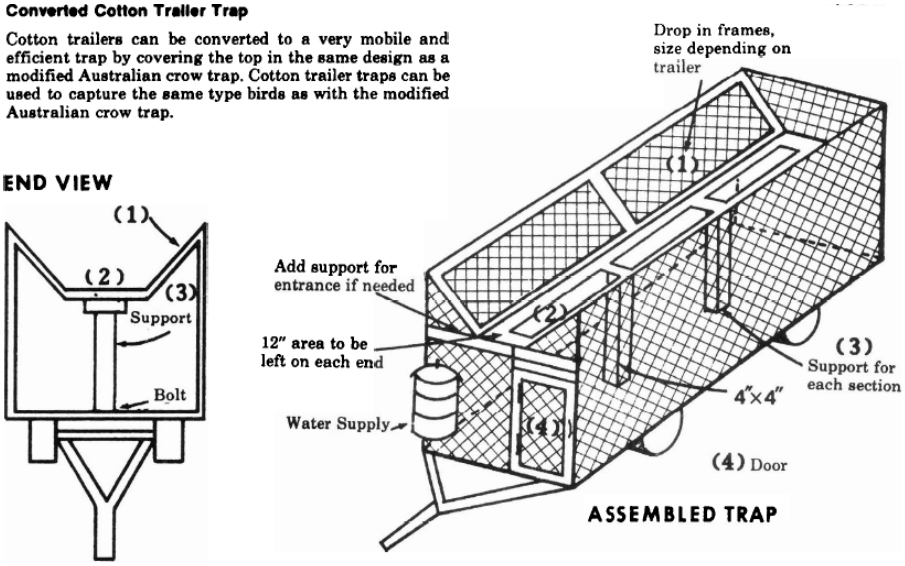
Toxicants: Avitrol® is a registered chemical frightening agent for blackbirds in corn and sunflower fields, though it is not commonly used in California. The bait is applied to fields in swaths, often by airplane, at the rate of 3 pounds per acre to one third of the field. The ingestion of one or more treated particles by a blackbird induces erratic flight, distress calls, and usually death. This behavior often causes the remaining birds in the flock to leave the field. Careful consideration must be given to the timing of initial and repeat baiting. Begin baiting when birds first initiate damage, and repeat as necessary, typically at five to seven day intervals. Dense weed populations that hide bait, ground insects such as crickets that eat bait, and excessive rainfall can contribute to making the product ineffective.

Trapping: Certain species of blackbirds, particularly redwings, brown-headed cowbirds, and common grackles, often can be trapped in decoy traps. Consult a state wildlife official such as a conservation officer or game warden before putting a decoy trap into operation. A decoy trap is a large (for instance, 20 x 20 x 6 feet) poultry wire or net enclosure containing 10 to 20 decoy birds, food, and water. Birds enter the trap through an opening (often 2 x 4 feet in the top of the cage that is covered with 2 x 4 inch welded wire. The blackbirds can fold their wings and readily drop through the openings to the food (generally cracked corn, millet, or sunflower seeds) below. A small (for example, 2 x 2 x 3 feet) gathering cage with a sliding door attached to an opening at an upper corner of the trap can be used to collect trapped birds. A corralling baffle running about two-thirds the length of the trap can aid in driving the birds into the gathering cage.

A decoy trap often catches 10 to 50 blackbirds and starlings per day and occasionally up to 300 when located near a large roost. Obviously, the decoy trap is of questionable value in trying to reduce large roosting populations and damage to the surrounding agricultural fields. These traps, however, can be used to temporarily reduce local populations of blackbirds in special situations. Decoy traps might also be successful in reducing localized populations around feedlots or fruit crops.

Any nontarget birds accidentally captured in a decoy trap should be released immediately. Blackbirds to be disposed of should be killed humanely. They can be transferred from the gathering cage to a cardboard box or plastic-covered cage and asphyxiated with carbon dioxide gas from a CO_2 bottle. All dead birds should be examined for bands, and any bands found should be reported. Dispose of dead birds by burying or in plastic bags in the trash.

Shooting: As discussed under Frightening, shooting to kill with a shotgun is most effective when used occasionally to supplement or reinforce other scare devices. By itself, shooting with a shotgun is not usually cost-effective in frightening blackbirds from large agricultural fields, and it is totally ineffective as a means of reducing populations.



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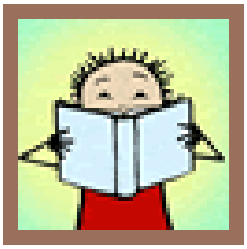
BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

Cedar Waxwing

Bombycilla cedrorum

Family: Bombycillidae



Introduction: The cedar waxwing is a nomadic fruit eating bird. Many aspects of its life may be traced to its dependence upon fruit. Indeed it specializes in eating fruit and can survive on this diet alone for several months. Unlike many birds that regurgitate seeds from fruit they eat, the cedar waxwing passes the seeds in the droppings. The name 'waxwing' comes from the waxy red tips of the secondary feathers.

Identification: The tail is tipped with yellow or orange depending on diet. Adults have a pale yellow belly. Immature birds are streaked on the throat and flanks, and often do not have the black mask of the adults. The flight of waxwings is strong and direct, and the movement of the flock in flight resembles that of a flock of small pale European Starlings. They are 6.5 inches in length. Further information is available at:

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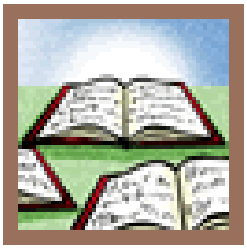
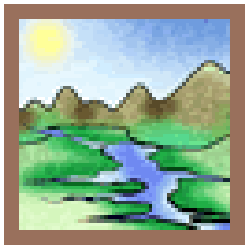


Legal Status: Cedar waxwings are listed as migratory nongame birds in the U.S. Code of Federal Regulations. They may be controlled only under permit from the U.S. Fish and Wildlife Service. No permit is required to scare or herd cedar waxwings.

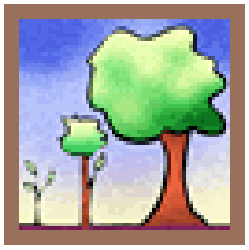
Damage: Cherries, grapes, strawberries, berries, and ornamental berries, have been reported damaged by flocks of cedar waxwings.

Range:

Cedar Waxwing

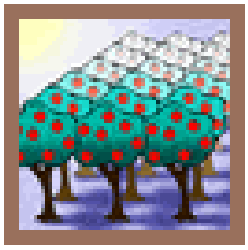


Habitat: Waxwings preferred habitat consists of trees at the edge of wooded areas, or "open" forests, especially those that provide access to berry sources as well as water. Waxwings are attracted to the sound of running water, and love to bathe and drink from shallow creeks. In urban or suburban environments, waxwings often favor parkland with well-spaced trees, golf courses, cemeteries, or other landscaping with well-spaced trees, bushes that provide berries, and a water source, such as a fountain or birdbath.



Biology: The cedar waxwing forages for fleshy fruit and insects. It catches flying insects and gleans insects from vegetation. It plucks fruit while perched, or may hover briefly to snatch fruit, or swallows entire fruit

The nest is a bulky open cup of twigs, grasses, moss, and other materials usually placed in a fork of a tree branch. Eggs are pale blue gray with sparse black spots. The clutch is usually four to five eggs.



Damage Prevention and Control Methods

Exclusion: Protective plastic netting has provided excellent protection in strawberries from flocks of cedar waxwings.

Frightening Devices: Frightening devices have usually been ineffective in dispersing cedar waxwings.

Trapping: A Federal permit is required. Modified Australian crow traps (MAC traps) are effective for capturing large numbers of waxwings. If allowed on the permit, the live birds should be released at a minimum of 20 miles from the trap site so they will not return. Palmer (1972) reported trapping 10,000 waxwings in Kingsburg, CA using MAC traps. See MAC trap illustration.

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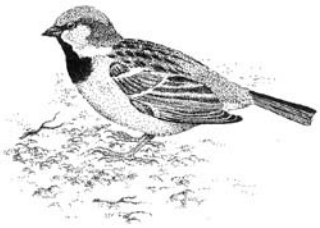
BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

Cliff Swallows

Petrochelidon phrrhonota

Family: Hirundinidae



Introduction: Eight members of the swallow family Hirundinidae breed in North America. Of these barn and cliff swallows, regularly build mud nests attached to buildings and other structures, which sometimes puts them in conflict with humans. Cliff swallows are most common around homes and other structures.

Identification: Cliff swallows nest in large colonies of up to several hundred pairs. The cliff swallow is 5 to 6 inches in length, and is the only square tailed swallow in most of North America. Visually it has a pale, orange brown rump, white forehead, dark rust colored throat and steel blue crown and back. The cave swallow is similar in appearance but is found in southeast New Mexico and central, south, and west Texas. Further information including audio is available at:

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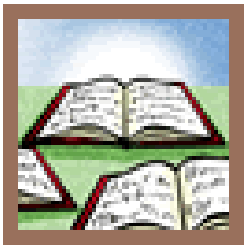


Legal Status: All swallows are classified under the Migratory Bird Treaty Act as migratory insectivorous birds and are protected by state and federal regulations. It is illegal for any person to take, possess, transport, sell or purchase them or their parts,

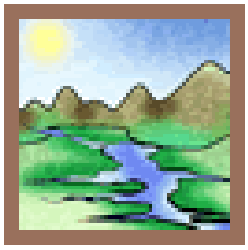
such as feathers, nests, or eggs, without a permit issued by the U.S. Fish and Wildlife Service. As a result, certain activities affecting swallows are subject to legal restrictions.

If the nests are occupied with eggs or young, a permit is required to destroy it. No permit is required to remove nests under construction or after the nests have been abandoned. California Fish and Game considers swallows as nesting from February 15 through September 1. During nesting, a permit authorizing nest removal may be issued only if strong compelling reasons exist. Some examples are safety and health hazards posed by nesting areas at warehouses and food processing centers, or at airports where aircraft safety is impaired. The permit will authorize the permittee, or its employees, to use specified methods to remove nests. For permit requirements, contact USDA-APHIS Wildlife Services at 3419A Arden Way, Sacramento, CA 95825; phone (916) 979-2675. You will be referred to a district biologist who will assess the problem and make control recommendations. If lethal control is recommended, then a permit application must be completed and sent to the U.S. Fish and Wildlife Service regional office along with a fee.

Damage: During the nesting period, March through June in California, swallows may become pests by building their mud nests beneath building eaves and other structures. Mud and fecal matter are dropped down onto power lines, walls, ledges, patios and walkways. They can interfere with human activities by fouling machinery, creating aesthetic problems and causing potential health hazards by contaminating foodstuffs. In addition, cliff swallow nests frequently contain insects such as swallow bugs (*Oeciacus vicarius*); these are related to bed bugs and will bite humans, although man is not their usual host.

Range: These migratory insectivorous birds spend the winter in South America and migrate annually to the United States. Cliff swallows are found throughout California, except in high mountains and the southeastern desert.

Cliff Swallow



Habitat: Cliff swallow colonies are found where there is a body of fresh water for drinking, open habitat for foraging, and a supply of mud suitable for nest building. In addition, they require a vertical surface immediately beneath an overhang for nest attachment.

The original nesting sites of cliff swallows were cliffs and walls of canyons and vertical banks. Human structures, such as buildings, bridges, and agricultural activities (irrigation, canals, reservoirs) have increased the number of suitable nesting sites and mud gathering areas. Cliff swallows populations have increased accordingly.

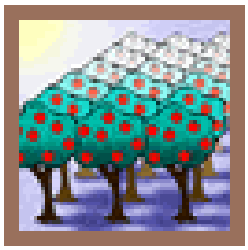
Biology: The cliff swallow is distinguished by its square tail, contrasting with the deeply forked tail of the barn swallow. Cliff swallows are 5 to 6 inches in length, have a white forehead, dark rust-colored throat, steel-blue crown and back and pale

orange-brown rump.

Cliff swallows spend their winters in South America and migrate northward to the United States in early spring. Nesting sites are reused and many birds return to the same site used in the previous year. Old nests are also reused, but it is only by chance that a particular nest will be reused by last year's occupant. If old nests are not used, the birds set about gathering quantities of mud that is plastered against a vertical wall immediately beneath an overhang, usually an eave.

In areas of California such as the Central Valley, many rivers, streams, gullies, and dirt-lined irrigation ditches carry water and provide an abundant supply of mud during the spring. Bridges and culverts over watercourses are preferred nest building sites for swallow colonies. In Southern California, where the winter rainy season is generally over before the swallows arrive, such structures are abundant but are rarely used as nesting sites. Dry conditions create a lack of mud available for nest construction. On the other hand, mud is available near dwellings where lawns and gardens are watered frequently, and most of the swallow nests are under the eaves of buildings.

Nests are gourd shaped, about 6 inches in diameter, with a neck like round entrance about 2 inches in diameter. During nest construction, birds do not inhabit the nests at night and begin to do so only when they are nearly complete. Eggs are laid during April and May, and the birds are very active tending and feeding the growing young. By the end of June, the young have left and the colony deserts the nests.



Damage Prevention and Control Methods

Exclusion: Exclusion refers to any control method that denies physical access to the nest site area. Exclusion can be a relatively permanent, long-term solution to the problem. A permit is not required for this method if it is applied before the swallows arrive or after they have left for the winter. If swallows are nesting and have eggs or young, exclusion may not be used without a permit.

Plastic net or poultry wire can provide a physical barrier between the swallows and the nest site. Optimum mesh size is ½ to ¾ inches; however, 1 inch has been used successfully. If plastic net is used, it should be attached so that it is taut. This reduces flapping in the wind, which looks unsightly and results in tangles or breakage at mounting points. For best results net or poultry wire should be attached to buildings before the swallows arrive and may be left up permanently or removed after the nesting season.

Usually, swallows will not fly into a net or other obstruction, but will stop and hover in front of it. If only that section of a building where swallows have nested is netted, the swallows will often choose alternative sites on the same structure. Therefore, any part of a building suitable for nesting must be netted.

Attachment methods may vary according to site requirements and the degree of permanence desired. Nets can be attached using tape, staples, Velcro, trash bag ties, or polyclips. More elaborate are hooks mounted on eaves and sides of buildings. One advantage is that netting can be removed more easily for painting or

maintenance. For net attachment, a supporting framework of wooden dowels along the edges can ease attachment. On concrete or cement structures, 'stud guns' can be used to attach wood lathes. The net or wire should extend from the outer edge of the eave down to the sides of the building so the eaves no longer provide protection from the elements. No openings should remain where swallows might enter. Hanging a curtain of netting from eaves is effective. The curtain should be 3 to 4 inches from the wall and extend down from the eave 18 inches or more.

A number of commercially available designs are available which provide metal projections that are sharp, needle-like wire devices generally installed on building ledges and window sills to discourage pigeons and starlings from roosting. Although adaptable to mounting and use under eaves, metal spines have not been widely used for swallow control. In one instance, cliff swallows learned to land on the metal spines and eventually built nests attached to them.

Habitat Modification: Substrate texture is a factor in nest site location. Wood, stucco, masonry, and concrete surfaces are favorable for nest attachment. Metal is rarely used as a nest substrate and then only at crotch or joints where the swallow can gain a foothold. In situations where construction is planned and swallows are present on nearby structures, consideration to materials and design may eliminate future problems.

Modification of the nest substrate has proven effective. Swallows overhang or prefer surfaces that provide a good foothold and nest attachment. Removal of the rough surface of a wall and or overhang makes a site less attractive. This may be accomplished in various ways. Fiberglass panels installed between the eave and wall to form a smooth, concave surface make nest attachment difficult. A smooth surface may also be created by draping a curtain of aluminum foil or plastic tarp from a wire strung along the junction of the wall and roof overhang. Other smooth-surfaced materials to deter nesting include glass and sheet metal.

Nest Removal: Only allowed outside of breeding season. During the season, the method of nest removal will be specified by the permit. Usually nests may be washed down with a water hose or knocked down with a pole. Swallows are strongly attracted to old nests or to the remnants of deteriorated nests, so all traces of mud should be removed to discourage renesting. Removing nests by these methods is a messy and time-consuming process and may cause dispersal of nest parasites and water damage to the building.

Architectural design can influence colony site suitability. Obtuse angles, rounded or concave meeting points for overhangs and wall are rarely used by cliff swallows. The width of the overhang may be important, although the point at which this becomes critical is unknown. Few colonies are observed with an overhang of less than 6 to 8 inches.

Frightening Devices: Hawk, owl, or snake models, noisemakers, and revolving lights have shown little, if any, success or are unproven against cliff swallows. As evidenced by colonies on buildings, cliff swallows are relatively tolerant of human activity and other disturbances.

Repellents: See earlier exclusion methods. There are no known chemical repellents.

Toxicants, Trapping, and Shooting: There are no chemical toxicants currently registered by EPA for swallow control; shooting, trapping or harming swallows is not permitted.

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BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

Common Raven

Corvus corax

Family: Corvidae

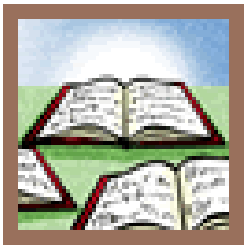
Introduction: The common raven is one of the most widespread species in the world capable of surviving in both Arctic and desert climates. Ravens opportunistically feed on eggs and the young of animals, including California condors (Coates 2006). Unnatural increases in raven numbers due to resource opportunities created by human-modified areas mean the raven can rapidly become a pest. Increased raven numbers also conflict with agriculture and crops.

Identification: Ravens are a very large bird, generally 22 to 27 inches in size. Males tend to be larger than females. Wingspan: 41 to 56 inches, weight: 24 to 57 ounces. Completely glossy black they have a relatively long, slightly curved bill with a long, graduated or diamond/wedge-shaped tail. Long pointed wings with obvious separation of primaries while soaring, and elongated throat feathers.

The common raven is an acrobatic flier. It frequently is seen making rolls and somersaults in the air. It has even been observed flying upside down for as far as one half mile. Breeding pairs of common ravens hold territories and try to exclude all other ravens throughout the year. The common raven often uses sheep wool to line its nest. When the female leaves the nest she may cover the eggs with the wool. Further information including audio is available at:

Cornell Lab of Ornithology

The Royal Society for the Protection of Birds



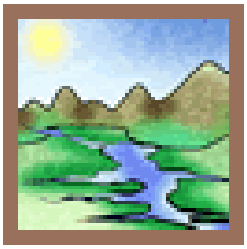
Legal Status: Ravens are classed as migratory nongame birds in the U.S. Code of Federal Regulations. They may be controlled only under a permit from the U.S.

Fish and Wildlife Service.

Damage: Poultry eggs and young poultry; young or sickly calves; lambs, ewes, and pigs; sprouting corn and grain seed.

Range: Resident, although classified as migratory, they are year round in much of the state except the High Sierra and thickly settled regions. The chief centers of distribution are the interior coast ranges of south-central California, the larger Channel Islands, and the northwestern humid coastal strip. The raven is non-migratory and its movements are local and sporadic.

Common Raven



Habitat: Mountains, plains, deserts, and seacoasts; coniferous, mixed, and deciduous forests.

Biology: Dawson (1923) states that ravens mate for life. Each spring, groups of ravens engage in spectacular aerial courtship rituals, after which the pairs disperse to their nesting sites. Nest building commences in April in coastal California, but it may start as early as February in the interior. The nest is a bulky affair constructed on a rock ledge or hole in a cliff or, in northwestern California, in a tree. Some pairs utilize the same nest year after year, despite loss of a brood. Only one brood is raised yearly, although a new clutch will be laid if the first set is destroyed. Three to eight eggs are laid, usually five or six, and incubated by the female for about 20 days. The young are able to leave the nest four to six weeks after hatching. Attended by their parents for some time after that, they are taught to forage for themselves. Soon after, the family departs the nest site for valleys where food is more easily obtained. Within a few weeks, the family breaks up and the young are left to feed for

themselves.

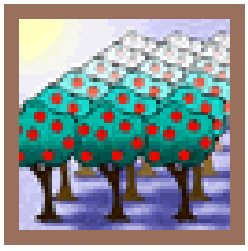
Ravens are scavengers and, though they prefer fresh meat, will eat carrion. Examination of ravens' stomachs in Oregon by Nelson (1934) indicated that small mammals, mostly young rabbits, accounted for an average 35 percent of adult and nestling diet in early summer, followed by insects, amphibians, birds, bird eggs, and corn. Year-round studies of food appear to be lacking. Stomach contents studies varied greatly among individuals, and local conditions undoubtedly alter the diet. Other foods taken include shellfish, acorns, nuts, fish, and young or weak livestock.

Ravens readily prey on lambs and ewes, particularly when inclement weather coincides with the lambing period. Early morning is a favored time of attack. Ravens are attracted to lambing ewes, perhaps in search of the afterbirth, and they will often attack the emerging or new-born lamb. The attack invariably begins at the eyes, which are eaten, progressing to the tongue, navel, anus, and heels. Eventually the body cavity is pierced, usually just behind the rib cage, the liver and heart being preferred. The udder of the ewe may also be attacked.

Lambs up to two weeks of age are also taken, particularly twins and sickly stock. The attack may begin with a preliminary peck to the eye region, which will induce hasty retreat in a normal lamb; but a sluggish response will call forth more vigorous attacks. Occasionally a lamb's eye will be pecked out as it sleeps in the morning sun, sometimes causing fatal loss of blood. Often a lamb or ewe will be alive but incapacitated to the extent that the rancher must destroy it.

Centers of bird activity vary from time to time owing to availability of food. A scarcity of ravens just prior to lambing is no indication that a problem will not exist. Depredations are often caused by relatively small groups of ravens (less than ten). The birds are very wary and frighten easily.

West Nile Virus: Ravens, as members of the Corvid family, are particularly susceptible to the West Nile Virus. Safety gloves should be worn at all times when handling these birds or their carcasses, and handlers should avoid all contact with blood. Agencies responsible for disease monitoring are often extremely happy to receive raven carcasses for examination, see www.cdc.gov.



Damage Prevention and Control Methods

Exclusion: Not practical in most situations.

Habitat Modification: As predators, ravens may become pests due to their predation i.e. they are considered a threat to the desert tortoise. Efforts to lower habitat quality for ravens might include reducing food sources by covering landfills and individual trash containers and removing road kills from highways, eliminating standing water, and denying ravens access to perch sites by installing spike like devices on utility poles and fence posts (Van Vuren 1998).

Frightening: Not usually a cost effective means of reducing raven damage. See crow chapter for information on frightening.

Fumigants: Fumigation is not practical for raven control, and no fumigants are registered for this purpose.

Repellents: None.

Shooting: Conditions for taking under the permit are specified in CFR § 21.41(c). They include, but are not limited to, killing only migratory birds described on the permit; unless otherwise specified, only a shotgun not larger than 10-gauge from the shoulder may be used. The take must occur over the area where the damage is occurring and must be specified on the permit. Any devices such as calls, decoys, blinds, or anything else that shall entice the birds within gun range are prohibited. All birds killed must be retrieved by the permittee and turned over to the permit issuer. Only persons listed on the permit shall take the birds. The tenure of the permit shall be specified on the permit and shall be observed.

Toxic Bait: The only toxicant currently registered with the United States Environmental Protection Agency (EPA) to remove ravens lethally is DRC-1339. Researchers have demonstrated that the acute toxicant DRC-1339 can be used for lethal control of common ravens for ecological and economic reasons as a short term measure with sporadic results (Coates 2006 and Spencer 2002). This is a restricted use pesticide and in addition to any permits that may be necessary to take ravens, special pesticide application licensing is required, see California Department of Pesticide Regulation. Methods for application of DRC-1339 have included injecting egg baits with the toxicant.

Trapping: Ravens have been successfully trapped in Australian crow traps (6" x 12" entrance holes) with eggs and turkey carcasses as bait. Proper trap placement and the use of decoy birds are important in trapping success.

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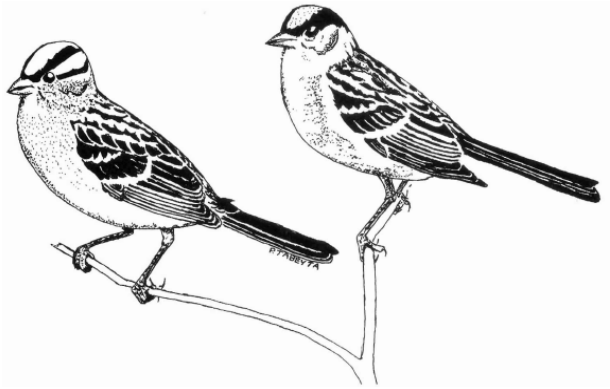
BIOLOGY, LEGAL STATUS, CONTROL MATERIALS AND DIRECTIONS FOR USE

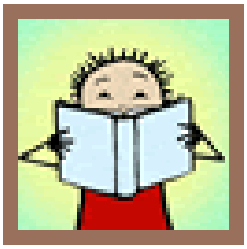
Crowned Sparrows

White-crowned Sparrow, *Zonotrichia leucophrys*

Golden-crowned Sparrow, *Zonotrichia atricapilla*

Family: Fringillidae



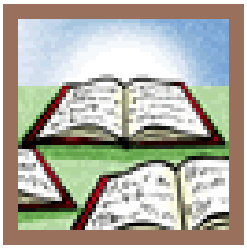


Introduction: Four of the five subspecies of white-crowned sparrows are migratory. Elegantly marked in gray, brown, black, and white, the white-crowned sparrow is one of the best-studied songbirds in North America. Much of our knowledge of bird song and development is based on studies of this species. This sedentary race lives in a very narrow band along the California coast. The most widespread race, breeding across northern Canada and wintering in the eastern United States, is the least-studied and least well known of all the races.

Identification: White-crowned sparrows have a distinct pink or yellowish bill, erect posture, gray throat and breast, and a visible crown streaked with black and white. Their call is a clear whistle.

Golden-crowned sparrows are similar, except they have no white head stripes. A golden yellow central crown stripe is prominent with black borders. Their call is three to five clear whistles. Overall, golden crowned sparrows are less numerous and cause fewer problems than white-crowned sparrows. Further information including audio is available at:

Cornell Lab of Ornithology



Legal Status: Crowned sparrows are classed as migratory nongame birds in the U.S. Code of Federal Regulations. They may be controlled under the general supervision of the county agricultural commissioner or under a depredation permit from the U.S. Fish and Wildlife Service.

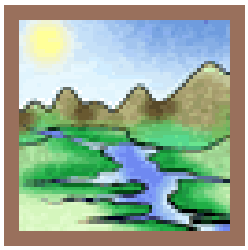
Damage: Crowned sparrows are involved in crop depredations over a wide area and upon a great variety of crops. Newly sown lawn grass and garden and flower seedlings are often completely consumed. Waves of migrating crowned sparrows have been known to destroy every small flower and vegetable planted in home gardens. The damage is most severe in areas adjacent to brushy river bottoms. Extensive damage often occurs to commercial plantings of lettuce, broccoli, sugar beets, alfalfa, and grain. Most of this damage occurs during the fall and winter period. Depredations are most noticed around field crops that have shrubbery or trees planted for windbreaks. These fields may be adjacent to river bottom brush or weedy fields. The damage occurs along the margin of the fields near dense cover that is favored by these birds. Often, this damage doesn't extend to more then 50 to 100 feet into the field. When the crop seeds germinate and emerge from the soil the seedlings are consumed by the birds. Damage normally stops when the seedlings reach a height of 3 or 4 inches.

Crowned sparrows play a minor role in disbudding attacks upon almond and other deciduous fruit trees. Occasionally, a few trees near a wood or brush pile may be severely attacked. Depredations increase as the buds swell.

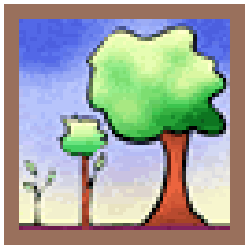
Range: Three races of white-crowned sparrow are responsible for crop depredation in California west of the Sierra Nevada. The more important, Gambel's race, breeds in Alaska and Canada, but winters in the interior valleys of California and from San Francisco Bay southward. The Nuttall's race breeds in a narrow coastal strip from Santa Barbara to San Francisco, then more widely through the humid coastal area to British Columbia. In California, the Nuttall's race winters along the coast from Mendocino County to Santa Barbara County. The Puget Sound race breeds from northwestern California to British Columbia, and winters along the coast to central California. The golden-crowned sparrow breeds along the cost from Alaska to northern Washington and winters west of the Cascades and in the Sierra Nevada to Baja California.

White-crowned Sparrow

Golden-crowned Sparrow



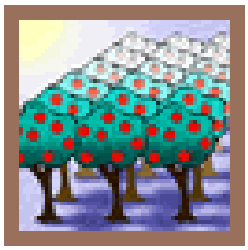
Habitat: White-crowned sparrows are found in chaparral, brushy river bottoms, brush piles, fence rows, weedy fields, suburbs, etc. Depredations are usually noticed near such cover, especially near brushy river bottoms. They commonly winter in dense hedges and thick plantings of shrubbery. Golden-crowned sparrows are birds of spruce forests, stunted forests of Arctic and mountain slopes; in winter, denser thickets and scrub growth.



Biology: Golden-crowned sparrows usually arrive in October and the latest individuals leave in April. Gambel's white-crowned sparrow appear in California in September, reaches its maximum density during October, remains abundant until March, and is not commonly seen after May. By midwinter, groups have stabilized into flocks of 30 to 50 which stay until spring. Some birds commonly return to the same location each fall. Recurrent waves of migrants pass through some areas in spring and fall, making control difficult unless suitable cover is removed. The two races of white-crowned sparrow that breed in California arrive at breeding grounds in May. The pair bond is established and a nest is built in a bush or on the ground among mosses sheltered by some higher vegetation.

Three to five eggs are laid. Incubation takes 12 days and age at first flight is commonly 10 days. One brood per year is raised.

Food of white-crowned sparrows averages 75 percent vegetable matter and 25 percent animal food. Most of the animal food is taken during the breeding season, and, while in California in winter, white-crowned sparrows live largely on seeds. Golden-crowned sparrows are less numerous and less well-known than white-crowned sparrows but diet is thought to be comparable.



Damage Prevention and Control Methods

Exclusion: To protect flower seedlings and home vegetable gardens, grow plants under frames covered with wire or plastic netting.

Protective Devices: For the protection of flower seedlings and small vegetable gardens, plants should be grown under frames covered with ½ inch mesh hardware cloth or ¾ inch octagon rabbit wire or a netting of small enough mesh to exclude sparrows.

Habitat Modification

Elimination of Cover: Since crowned sparrows feed within a few yards from a safe retreat, the elimination of brush piles, rolls of wire, and stocks of wood around vulnerable crops can be effective in reducing damage. Weed borders along fields; fence rows and unnecessary shrubbery should be removed if occupied by sparrows.

Frightening Devices: Historically the most widely used sound devices for minimizing crown sparrow depredations were the automatic propane exploders. These units should be moved every day or two to prevent the birds from becoming habituated to the sound. Shell crackers fired from a 12-gauge shotgun, bird bombs®, and bird whistlers® discharged from a 6mm flare pistol are commonly used to frighten sparrows from fields. Some growers have reported limited success with raptor-mimicking kites tethered to stationary posts positioned along crop borders. Unfortunately, since crowned sparrows are so closely associated with available cover, frightening them often just drives them back into the cover and not from the general area.

Fumigants: Not a recommended method of control. None are registered.

Repellents: Capsicum in granular formulations is federally registered for repelling sparrows from certain fruit, vegetable, and grain crops. Always read product labels for specific information. These have not been reported as very effective.

Toxic Bait: None are registered.

Trapping: Crowned sparrows are usually quite easy to trap by using a lily-pad or clover-leaf trap and have been taken in modified Australian crow traps. A trap 3 feet high and 3 feet in diameter will take quite a number of birds at one time. Effective bait for trapping has been milo or finely cracked corn (chick scratch). Trapped birds should be euthanized using CO_2 gas from a bottle.

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