

Sandhill and Whooping Cranes

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Figure 1. An adult sandhill crane (*Grus canadensis*) with a 1-week old chick.

Human-Wildlife Conflicts

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As sandhill crane populations continue to grow in the United States, so too does crop damage, property damage to homeowners, and the risk of crane collisions with aircraft. Whooping crane populations also continue to grow, but with a global population of about 500 individuals (as of 2017), damage is rare and problems often require different solutions due to the species' endangered status.

The behavioral characteristics and habitat needs of sandhill (Figure 1) and whooping cranes set the stage for conflict between these birds and people. Recognizing

behavioral differences between territorial and non-territorial cranes greatly improves the effectiveness of any management effort.

Crops

Crop damage is the most common and economically significant crane damage management problem. Cranes eat planted seeds, especially corn. In spring, damage can be intense, as cranes often gather in germinating cornfields. Cranes do not feed on seedlings, but rather the planted seeds, which are vulnerable until the endosperm

is fully metabolized by the plant. The period of vulnerability depends on soil temperature and typically lasts from planting to 17 days after germination. Cranes will continue to forage in these fields on other resources even after the plants are no longer susceptible to damage.

Non-territorial sandhill cranes are unpredictable in their habitat use and can disperse across a landscape of 25,000 acres. Dispersed sandhill cranes can quickly congregate into flocks of 50 to 100 birds and cause significant damage in a short time. Non-territorial sandhill cranes cause most of the damage to planted cornfields.

In spring, a crane eats on average about 400 kernels of corn per day. Some cranes will not feed in agricultural fields, while other will eat up to 800 corn kernels per day. A flock of 100 cranes foraging in a planted cornfield for 3 days can eat about 240,000 kernels or 100 percent of about 8 acres. Damage, however, typically is spread out over the entire field and includes about 20 to 30 percent of the planted seeds (Figure 2).

Damage levels occasionally reach 50 to 60 percent. Often, entire fields must be replanted, at a significant cost to the grower.

The timing of planting is important in determining patterns of damage. If several fields are planted at the same time, damage may be spread out over a larger area and be



Figure 2. Stand reduction in a cornfield caused by sandhill cranes. The extensive brown areas of the field left and below the dashed line have virtually no seedlings. Corn to the right and above the dashed line was treated with a repellent whereas the remaining field was not.

relatively minor in any one field. Fields planted much earlier or later than the average planting date are more susceptible to damage. This is especially true for late-planted fields because cranes conditioned to feeding on planted corn compete for the diminishing supply.

Territorial sandhill cranes seldom cause significant damage because their density is low. They damage field edges located near wetlands where they are nesting. Whooping cranes have been seen eating planted corn seed. Those involved in human conflicts have been territorial birds from reintroduced flocks.

Landscapes

Sandhill cranes occasionally damage lawns by digging in the soil for beetle or other insect larvae (Figure 3). This problem most often occurs with newly seeded lawns, especially where old fields are converted to turfgrass.

Structures

Cranes can damage homes, automobiles, and commercial buildings. Although lawns that surround structures likely are the primary attractant, reflective surfaces, such as windows, sliding glass doors, and automobiles, are also alluring to cranes. A territorial crane looking at a reflective surface sees an intruding crane and responds as it would to any potential competitor (Figure 4).



Figure 3. Damage to a new lawn by cranes digging for insect larvae.



Figure 4. Reflective surfaces can attract sandhill cranes, occasionally resulting in damage to the structure or crane.

The reflected threat displays escalate, leading to an attack by the territorial crane, sometimes resulting in damage to the property and injury to the bird. Non-territorial birds do not respond to reflections in a similar manner.

Power lines pose a significant threat to cranes. Cranes often collide with the upper static wire of lines located near flight paths, resulting in damage to both the birds and the powerlines.

Human Health and Safety

Cranes can be a threat to people and property through collisions with aircraft. Territorial cranes can cause long-term problems at airports near wetlands because they defend specific areas and are attracted to the open, short-grass habitat around runways.

It is illegal to feed sandhill or whooping cranes in Florida. This law was developed because extensive development in previously rural areas brought nesting cranes and humans into close contact. Cranes were habituating to humans through their handouts and habituation can lead to rare,

but serious, injuries. Cranes can become aggressive, especially when defending young. This degree of habituation can occur anywhere. As both cranes and cities expand their distribution, the problem may become more widespread.

Damage Identification

Cranes probe for food in loose soil. When the first leaf of a corn plant emerges, the endosperm still remains in the seed. The leaf provides a visual cue that leads foraging birds to the planted kernels that lay just below the soil surface. Birds readily remove planted seeds and discard the attached leaves (Figure 5). Planted seeds are vulnerable to foraging cranes until the endosperm is fully metabolized by the plant.

Crane damage to planted seed in agricultural fields is easy to distinguish from damage caused by pheasants or turkeys because cranes are the only species that probe for seeds rather than scratch the soil surface to expose seeds. Cranes can efficiently remove planted seeds that occur in a row at predictable intervals (Figure 6). Sometimes a small amount of soil is mounded to the side of a single hole where the bird has dug with its beak. Although cranes can dig in any soil, they prefer loose soils, such as sand or silt. Cranes damage turf by digging with their bills rather than probing (Figure 3). Feathers often are seen near probe holes.



Figure 5. Small leaves of corn seedlings lay adjacent to holes where cranes have removed the seeds.

Sandhill cranes also cause agricultural damage to potato and small grain crops. Although cranes may eat some potatoes, most damage is caused by cranes exposing the potatoes to sun and by scratching or eating only part of the potato. In standing grain crops, cranes will eat ripening seeds or knock them to the ground. In swathed fields, cranes eat grains in windrows. Such damage to swathed rows can be severe during crane migration.

Reflective surfaces, such as windows, that are attacked by cranes often have extensive smears of blood on the surface or adjacent areas (Figure 7). These encounters are stressful for both the bird and people.

Management Methods

Solutions for managing crane damage tend to be more effective if the social status of the offending cranes is considered. Methods that exclude or disperse birds from an area are more difficult to use against territorial cranes because these birds often adapt to disturbances in order to remain in their territory. Territorial birds cannot breed if they have no territory. Non-territorial birds are more flexible in their habitat use and are more easily deterred.

Though many different control methods have been used to prevent crane damage, few have been effective over large

areas or for long periods of time. Cranes are intelligent, long-lived birds that often acclimate to tools designed to prevent them from foraging on or using certain resources.

Prevention and control methods for sandhill and whooping cranes are similar. However, many methods may not be used with whooping cranes as they are listed as a federally Endangered Species in some areas of the United States.

Habitat Modification

Two forms of habitat modification are used to manage cranes: 1) structural modification, and 2) supplemental feeding.

Structural Modification

Homeowners, producers and others may need to modify their property or the storage of their property to reduce destructive crane behaviors. Anything that creates a life-sized reflection of a crane is susceptible to attack by territorial cranes. Remove or cover the reflective surface that is causing the problem. Park cars in garages or use a car cover. Install shutters or opaque tarps over windows.



Figure 6. Holes left by sandhill crane probing for planted seeds.



Figure 7. Bloodied window where a sandhill crane attacked its reflection.

Attach decals or long strips of bird tape to windows. Cranes, however, may continue to attack reflections that are visible through screens and other physical barriers. Cranes may not leave the area because they tenaciously maintain their territories.

Powerlines kill cranes that collide with them and are subject to damage, especially when installed in areas with high crane use, such as between night roosts and daytime feeding areas. If possible, reroute or bury powerlines in areas frequently used by cranes.

Supplemental Feeding and Lure Crops

Extensive supplemental feeding programs have been used worldwide to prevent migrating and wintering cranes from damaging fall or winter-seeded fields and standing cornfields, as well as to support tourism. For example, these programs have occurred in Israel, to keep staging or wintering Eurasian cranes (*Grus grus*) in the Agamon wetland from damaging nearby agricultural fields; in northern Germany to protect germinating winter wheat fields during fall migration; in Japan to support overwintering red-crowned (*Grus japonensis*), white-naped (*Grus vipio*), and hooded cranes (*Grus monacha*); and in Spain where excess seeding is done to provide food for wintering Eurasian cranes while allowing some seeds to germinate. In all cases, the feeding programs attracted cranes and reduced foraging in outlying areas as long as the supplemental food was available. Over the long term, however, crane numbers increased dramatically, resulting in a decrease in the effectiveness of the lure crops. Where supplemental food supplies did not keep pace with population increases, cranes expanded foraging flights out from the treatment area and damage resumed, often at a greater rate than before supplemental feeding began.

Extensive feeding programs are expensive. In some places, the cost of feeding is offset by income from tourists who come to see the birds or farmers experiencing the damage. To be sustainable, tourism or farm income needs to be linked to the feeding expense such as is done to some extent in the Hula Valley in Israel (Figure 8).



Figure 8. Habituation of Eurasian cranes (*Grus grus*) to tractors used for feeding (top) and viewing (bottom) cranes in the Hula Valley, Israel.

Frightening Devices

The use of frightening devices is the most common management method for reducing crane conflicts. Propane cannons, flags and streamers, powerline diverters, and pyrotechnics all are designed to elicit fright or avoidance responses. These devices range greatly in their effectiveness, manner of deployment, and duration of effectiveness. Frightening devices often move birds from one field to the next, so damage is dispersed rather than eliminated. Though it can be argued that dispersing the problem may decrease the damage for any one field or farmer, the likelihood is high that cranes will habituate to field disturbances and damage will resume.

Auditory

Propane cannons and pyrotechnics have been used to disperse cranes from cropfields and airports. These are

effective when the individual cranes that encounter them are naïve to the devices. Any deterrence is soon lost, however, especially if the resources of concern are highly preferred by cranes. Auditory frightening devices work best on cranes at staging areas where stop-over times often are short.

Visual

Powerline diverters make powerlines easier to see by flying cranes. Powerline diverters come in a variety of forms that differ in ease of attachment, longevity, and function. Firefly units move and reflect light at wavelengths that are readily seen by birds. The units, however, are deployed vertically and may fall within the blind spot of cranes (directly forward). Pigtail diverters (Figure 9), are horizontally oriented and more readily seen by cranes. Diverters can reduce, but not eliminate, the risk to powerlines that are already in place.

Reflective streamers attached to fences may divert cranes from small fields. However, given their cost and the time required to install them, streamers may only be cost-effective for high-valued crops. Lasers have been used to disperse some species of birds at night, but they have not been used to reduce or prevent damage by cranes.

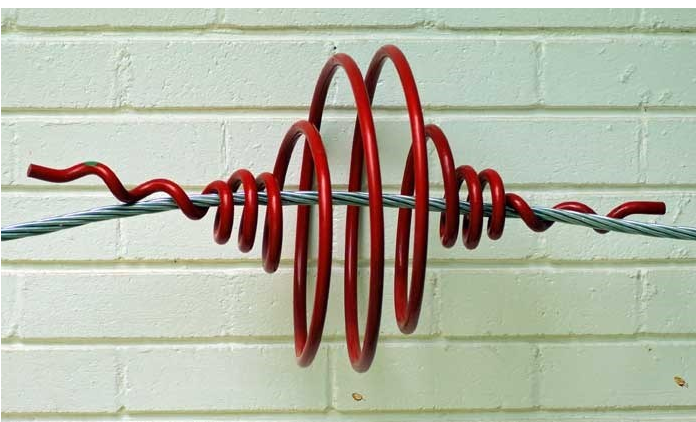


Figure 9. A close up view of a pigtail diverter used on a powerline.

Biological

Guard dogs can be used to patrol sensitive areas to prevent crane damage, but they are labor intensive and have a limited area of effectiveness. Where individual fields tend to be smaller, dogs may be a viable deterrent.

Repellents

Registered as Avipel®, 9,10 anthraquinone (AQ), can be applied as a powder or liquid to seeds of most grain crops. AQ causes distress in the gut of birds that ingest treated seed, which leads to an aversion to the food. While gut receptors are sensitive to AQ, other receptors also function to facilitate aversion. Tested birds have the ability to detect AQ through taste, sight, and smell. Researchers observed marked cranes foraging in treated corn fields, and saw birds that sampled planted kernels in treated rows shake their heads and spit out the kernels. The same birds quickly moved to foraging on waste corn and insects between rows.

Some plants express AQ during the maturation process to aid in seed dispersal. High concentrations of AQ in unripe fruit are thought to deter consumption by birds. Once ripe, the plant withdraws AQ from the fruit. Birds eat the fruit and disperse the viable seeds. Some insects also concentrate AQ in their bodies which is thought to deter bird predation.

AQ is registered for row crop seed treatment in 26 states on an experimental basis, mostly under a U.S. Environmental Protection Agency (EPA) Section 24(c) Special Local Need registration. The manufacturer, Arkion Life Sciences, LLC, is seeking a full EPA Section 3 label. Follow all label requirements when applying Avipel®. AQ is the only product that can be legally used in the U.S. to repel cranes from planted agricultural seeds. Both methyl anthranilate and limonene were field-tested as seed treatments, but neither substance was shown to be effective.

AQ has no known long- or short-term negative effects on cranes and is considered non-toxic to birds. Field studies of a marked population of sandhill cranes over more than two

decades indicate that no long-term, cumulative effects are caused by widespread annual use of AQ. One multi-year study involving marked cranes over a 16,000-acre area in Wisconsin showed no difference between crane mortality or productivity rates in AQ-treated versus untreated areas.

Repellent-treated seeds do not necessarily prevent cranes from using and foraging in crop fields. Cranes with an aversion to the treated seeds can distinguish one food item from another and usually forage on other food items (i.e., earthworms, insects) in the same field without causing damage. Therefore, it is not necessary to disperse cranes from AQ-treated fields. Allowing birds to stay in a AQ-treated field reduces the chance that the cranes will acclimate to the repellent and prevents the problem from being moved elsewhere. Since cranes inevitably switch their diet from seeds to other foods as seedlings grow, the repellent simply changes the timing of when corn or other crops become unavailable.

Trapping

Trapping of cranes to reduce damage is impractical in most situations. Most populations of sandhill cranes are too large for trapping to significantly alter their size. Trapping can be used to remove individual cranes when they cause harm or threaten people or property. Whooping cranes have been removed from problem areas three times: 1) near an ethanol plant where a crane endangered itself by frequenting construction areas, 2) near an airport where a crane on a runway caused safety concerns, and 3) in a zoo where officials were concerned that a free-flighted male would become aggressive towards zoo visitors. In all three cases, the captured birds were part of reintroduced flocks that were classified as “experimental and non-essential” under the Endangered Species Act.

Shooting

The Migratory Bird Treaty Act of 1918 provides for the issuance of depredation permits to kill specified numbers of sandhill cranes causing damage, but only after non-lethal options have been tried and failed. Most depredation permits allow the use of rifles or shotguns to take cranes. All laws, regulations, and ordinances pertaining to use of

firearms and ammunition apply and vary by jurisdiction. In Wisconsin, where sandhill cranes breed and crop damage complaints occur, the U.S. Fish and Wildlife Service issues depredation permits only after USDA Wildlife Services confirms the damage and that non-lethal methods have failed to alleviate the problem. Procedures for issuing depredation permits differ in other states. Depredation permits for whooping cranes are rarely issued.

Furthermore, regulated hunting of sandhill cranes is allowed in 15 states and requires both federal and state licenses. Documentation is lacking, however, to determine whether hunting or other lethal means of removing sandhill cranes reduces crop damage.

Handling

Both federal and state licenses are required before any live crane can be handled. Cranes are large, have very sharp toenails and stout, pointed bills—all of which can severely injure a handler. It is important to obtain proper training before handling any live crane. Generally, eye protection, long-sleeved shirts and long pants are required. Cranes are best held with the head located behind the handler’s body, the body under an arm and supported by one hand while the other hand is used to control the feet (See Ellis et al. 1996 for more information).

Translocation/Relocation

The capture and translocation/relocation of cranes is not recommended. Captured cranes typically are placed in captivity because of concerns they will continue to cause conflicts, if released.

Euthanasia

Shooting is the most common method of humane killing for cranes.

Disposal

Unless specific exemptions are provided, such as using carcasses as deterrents, all lethally-removed cranes should be buried or incinerated.

Economics

There are no economic estimates for sandhill crane damage to crops nationwide. Statewide estimates are approximated by wildlife and agricultural agencies. For example, Wildlife Services in Wisconsin received 265 complaints regarding sandhill crane damage to field crops in 2013, with reported damage estimated at \$1.9 million.

In Wisconsin, about 2.8 million acres of corn are grown within $\frac{3}{4}$ mile of emergent wetlands potentially used by cranes for roosting. Although cranes do not occur in all of these wetlands, treating for crane damage on a landscape scale is impractical, costly, and exceeds the capability of any single organization or government agency. The use of AQ as a repellent can be implemented at smaller, but still significant, scales by farmers who are directly impacted by crane damage (Figure 10). Typically, the farmer's cost of applying AQ is about 3 percent the cost of planting or less than 10 percent of the average amount of damage that occurs to an untreated field, not including the cost of replanting.

Species Overview

The sandhill crane (*Grus canadensis*, Figure 1) is a long-lived, member of the crane family (Gruidae) and the most numerous of the 15 crane species found worldwide. Over the last 50 years, the species has grown from a rarity—requiring extensive protection—to an abundant, widespread species. As their populations have increased, so too have their conflicts with people.

With less than 500 individuals remaining, the whooping crane (*Grus americana*, Figure 11) is one of the most critically endangered species in North America.

Identification

Cranes are among the largest birds in North America. Sandhill cranes stand nearly 5 feet tall and whooping cranes are even taller. They fly with their necks stretched out forward and feet stretched out backward. They stand and roost on the ground rather than perching in trees.

Physical Description

Within North America, there are six types of sandhill crane that vary in size and weight. The largest is the greater sandhill crane which averages 4.5 to 5 feet tall and 10 to 14 pounds. By foraging on high-energy foods in the fall, sandhill cranes can increase their body mass by as much as 3 pounds. The arctic-breeding lesser sandhill crane, is the smallest type, standing 3 to 3.6 feet tall and weighing 6 to 7 pounds. Male whooping cranes average 13 pounds and females weigh about 11 pounds.

Sandhill crane plumage is gray, but it often takes on a rusty color in early spring from iron-rich mud that they preen into their feathers. Sandhill cranes in some areas, such as the Pacific Northwest, remain gray all year because they are not exposed to iron. Rusty-colored plumage of spring gradually is molted through the summer, so by fall most sandhill cranes appear gray. Adult sandhill cranes have red skin on the top of their heads and white feathers on their cheeks.

Whooping cranes are mostly white, with black and red markings on their head. Their wings have black primaries

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
WI	37,768	18,038	40,514	44,832	57,586	76,309	111,389	150,132	135,105	75,825	125,000
MI	1,445	713	12,500	11,940	12,000	6,915	16,830	32,750	27,155	14,250	18,750
MN	632	12	1,200	3,000	2,000	830	2,676	6,750	6,878	875	3,400
TOTAL	39,845	18,763	54,214	59,772	71,586	84,054	130,895	189,632	169,138	90,950	147,150

Figure 10. Acreage of anthraquinone-treated corn seed to repel cranes in the upper Midwest states of Wisconsin (WI), Michigan (MI) and Minnesota (MN), 2006-2016.



Figure 11. A banded adult whooping crane (*Grus americana*).

that are very noticeable in flight, but are not visible when the wings are folded. Unlike sandhill cranes, whooping cranes do not preen wetland soils into their feathers. Thus, their plumage appears white year-round.

Range

Migratory sandhill cranes breed in arctic to temperate environments, from eastern Siberia through most of Alaska, Canada, and the northern third of the U.S. (Figure 12). Non-migratory sandhill cranes breed in Florida, southern Mississippi, southern Georgia (Okefenokee Swamp), and Cuba.

In winter, most sandhill cranes can be found in the southeastern U.S. from southern Indiana to the Gulf and Atlantic Coasts. In the West, most sandhill cranes winter in more distinct groups that range across northern Mexico, California, Arizona, New Mexico, and Texas.

Historically, whooping cranes nested in three distinct ecosystems: 1) the sub-arctic and taiga, 2) the upper tallgrass prairie in temperate North America, and 3) the

coastal plain of the Gulf of Mexico. Of these breeding areas, only the migratory population that breeds in Wood Buffalo National Park, Canada, and winters at Aransas National Wildlife Refuge, Texas (Figure 13) survived a severe bottle-neck in the 1940s when this population was reduced to 14 or 15 birds. Since then, the remnant migratory population has increased, and 3 of 4 reintroduction projects that have been attempted are still extant, although none is self-sustaining. An Eastern Migratory Population (EMP) currently breeds in southern Wisconsin and winters in the southeastern U.S. In addition, a non-migratory population is being re-established in the coastal plains of Louisiana. A different non-migratory population also was reintroduced to Florida during the 1990s, but reintroduction efforts in this area have ceased with the population being declared unsustainable.



Figure 12. Range of the sandhill crane in North America.

Voice and Sounds

Both crane species have two distinctive calls that are heard easily at a distance. Males or females in flight or on the ground give a guard call, while a bonded pair gives the unison call in a synchronized duet only while on the ground. The guard call of sandhill cranes is a loud rattle that carries up to 1.5 miles; a bird uses it when it is disturbed or feels threatened. For whooping cranes, the guard call is a 2-noted blast that sounds like “whoop.” For sandhills, the unison call is a duet where the male begins with a 1-note rattle and the female quickly follows with a 2-note, higher-pitched bark. The male to female cycle of calling is repeated several times as part of one synchronous vocalization. Unison calls from both the male and female sound as if they are from a single bird. It is given to form or maintain pair bonds and as a territorial defense. The unison call for whooping cranes sounds like a

series of whoops rather than rattles typical of the sandhill cranes.

Tracks and Signs

The footprint of a sandhill or whooping crane is easy to distinguish from that of a turkey or other large bird that perches in trees. Cranes are adapted to walking on the ground and have a reduced back toe (hallux) that prevents them from perching in trees. Crane tracks reflect the three forward toes without an extensive imprint from the hallux (Figure 14). Turkeys and herons, on the other hand, have footprints with three anterior toes and one large hallux.

Reproduction

Both sandhill and whooping cranes reach sexual maturity at 2 to 3 years of age. In dense breeding populations, however, the age that birds can obtain a territory, and thus successfully breed, often is 5 to 7 years. Cranes typically lay two eggs in initial nests of the season and one egg in replacement nests, if the first nest is lost. When two chicks hatch from the same nest, only one typically survives. One chick either starves, is killed by a predator, or is killed by its sibling before fledging. Only one clutch is raised per year.

Nesting

Cranes build their nests in emergent wetlands, but sandhill cranes sometimes nest in uplands. Crane nests typically are low mounds built from the dominant vegetation in the area.

Mortality

Annual mortality rates for adult sandhill cranes average 8.3 percent per year in the eastern population and does not differ between males and females. The annual mortality rate in the EMP of adult whooping cranes is about 10 percent. Cranes have higher mortality rates during their first year of independence than during subsequent years.



Figure 13. Range of whooping cranes in North America.

Primary causes of adult mortality include predation, poisoning (i.e., mycotoxins from peanut fields), collisions with powerlines, illegal shooting, and disease.

Population Status

Populations of sandhill cranes were dramatically reduced or eliminated in the early 20th century, but some have recovered to healthy levels. Recovery was most dramatic where wetlands remained and cranes adapted to foraging in agricultural fields. The frequency and severity of crop damage rose as populations recovered.

Sandhill cranes are abundant throughout much of North America, numbering 600,000 to 700,000, although some non-migratory subspecies are considered critically endangered (Mississippi sandhill crane, *G. c. pulla*; and Cuban sandhill crane, *G. c. nesiotus*) or near threatened (Florida sandhill crane, *G. c. pratensis*) under the Endangered Species Act. A few migratory populations are still small (i.e., Colorado River Valley Population of greater sandhill cranes) and are thus of concern.

Whooping cranes number only 400 to 500 birds in the wild and are located in four groups: 1) the EMP is a reintroduced, migratory flock of about 100 birds that resides east of the Mississippi River and summers primarily in Wisconsin and winters from Illinois to Florida; 2) a flock of about 50 non-migratory birds is being reintroduced into Louisiana; 3) about eight birds remain of a non-migratory flock that was established in Florida; and 4) a wild, remnant population of 329 birds is slowly increasing in size and migrates between Wood Buffalo National Park (Alberta and Northwest Territories, Canada) and Aransas National Wildlife Refuge (Texas).

Habitat

Most sandhill cranes are migratory. In summer, ideal habitat includes a mix of shallow emergent wetlands that are located near upland areas. Cranes prefer uplands dominated by short vegetation, less than 1.5 feet in height. In spring, agricultural fields near wetlands where cranes nest offer excellent upland habitat and are used heavily. Cranes build their nests in emergent wetlands and usually

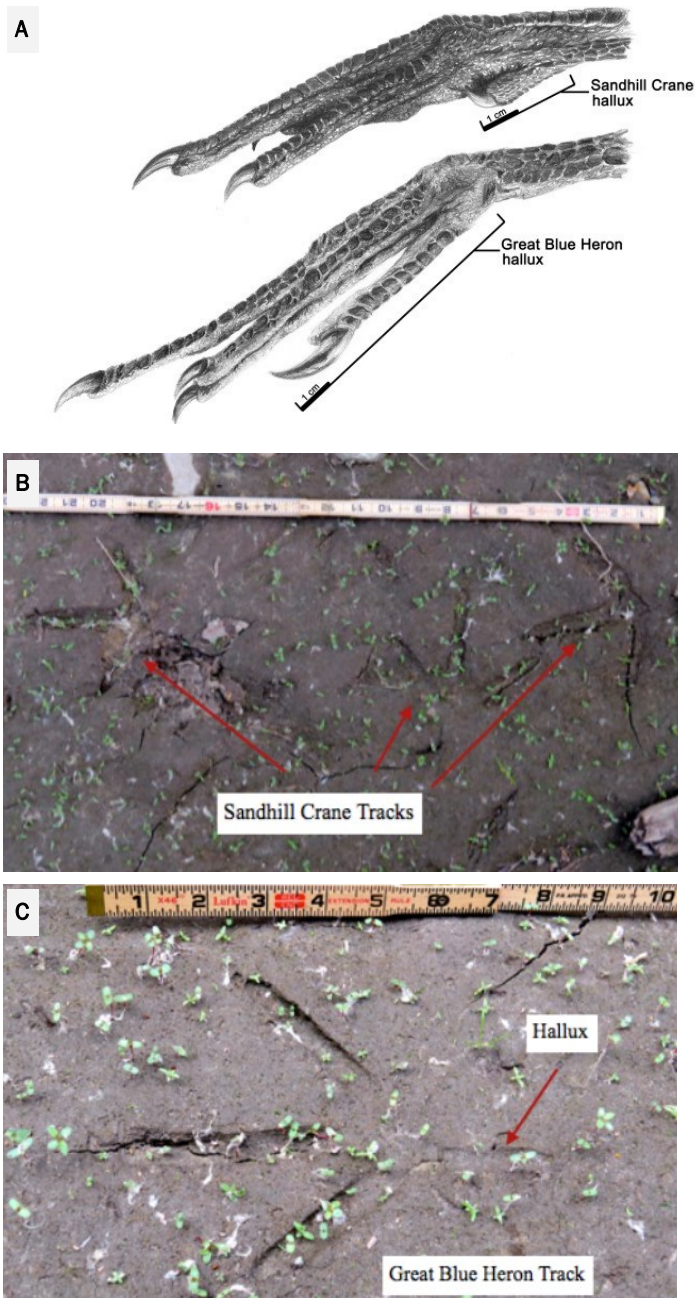


Figure 14. The rear toe (hallux) of a mature sandhill crane is less than half the length of a great blue heron's (A). As a result, tracks from sandhill cranes do not show the imprint of the hallux (B), whereas it is present for the heron (C).

roost at night in open water portions of these same wetlands. Although both territorial and non-territorial birds forage in uplands and wetlands during the day, territorial birds typically feed in uplands adjacent to their nesting wetlands, while non-territorial birds fly 1 to 2 miles from their nighttime roosts to upland fields.

Cranes are relatively safe from predators in agricultural fields where the low vegetation makes it difficult for predators to approach undetected. The open space of upland fields also provides a place for crane socialization, an activity that is especially important to non-territorial birds.

In the winter, cranes roost in shallow, open river streams or open wetlands and often fly out to agricultural fields during the day. Cornfields are the most common habitat that cranes forage in during the day, but migrating cranes also hunt for small animals in wet meadows and pastures. Cranes return to open water areas to roost at mid-day. During the winter, cranes forage up to ten miles from wetlands where they roost, and home ranges of either species can be up to 19 square miles.

In the summer, whooping cranes use similar types of wetlands, but tend to spend more time in wetlands than do sandhill cranes. Whooping cranes occasionally feed in uplands, especially agricultural areas up to 12 miles from nesting territories. Whooping cranes also forage in agricultural fields after harvest during the fall and winter. Whooping cranes tend to be territorial during the winter in the Aransas National Wildlife Refuge and forage predominantly in estuarine areas, although they sometimes fly out from winter territories for fresh water or non-wetland foods, such as acorns.

Behavior

Sandhill and whooping cranes are intelligent, territorial, and long-lived omnivores that are highly philopatric (tend to return to or remain near a particular site or area year after year). Both species are diurnal throughout the year. Although North American cranes are excellent flyers, they spend most of their time on the ground. Territorial cranes develop home ranges that are predictable and relatively small (0.5 to 1.1 square miles for sandhill cranes and 1.4

to 1.8 square miles for whooping cranes). Non-territorial birds of either species are much more mobile and have home ranges of 12 to 160 square miles. During the summer, non-territorial cranes congregate in flocks that vary from 1 to 100 individuals. In the spring, most non-territorial cranes are found within $\frac{3}{4}$ mile of a roosting wetland, but individual birds often will fly up to three miles away to feed. Non-territorial birds select habitats on any given day in an unpredictable manner, covering areas up to 5 to 10 times larger than areas frequented by territorial birds. Non-territorial sandhill cranes account for about half of the overall summer population of this species. Whooping cranes in the EMP fly up to 12 miles from their nesting territory on a daily basis, occasionally during incubation and frequently after losing their nest.

At night, both species of cranes prefer to roost in shallow wetlands or rivers. Occasionally either species will roost in shallowly-flooded agricultural fields and even in dry agricultural fields, if vegetation is sparse.

Food Habits

Sandhill and whooping cranes eat similar foods. While in upland fields, cranes feed on seeds, such as corn left over from the previous year's crop, insects, earthworms, planted seeds, tubers, snakes, rodents, eggs, and young birds. Corn, wheat, barley, rice, and sunflower seeds are desirable foods. In wetlands, sandhill and whooping cranes eat a variety of animals, including birds (mostly nestlings and eggs), rodents, snakes, frogs (adults and tadpoles), insects, fish, snails, mussels, crayfish, and turtles. In addition, cranes eat a wide array of plant material, including tubers, rhizomes, seeds, berries, and flowers. Since whooping cranes spend more time in wetland habitats, they tend to eat more of these foods than do sandhill cranes.

Legal Status

Both sandhill and whooping cranes are protected under the Migratory Bird Treaty Act (MBTA) of 1918. This law strictly prohibits the capture, killing, or possession of sandhill and whooping cranes without proper permits. However, the U.S. Fish and Wildlife Service (USFWS) can issue depredation permits under this act for the shooting of sandhill cranes that cause agricultural damage or threaten human health and safety. No federal permit is required to use non-lethal management methods to reduce damage by sandhill cranes.

State laws also apply to various crane populations. For example, the small breeding population of sandhill cranes in Ohio is considered a species of management concern even though it is part of the larger eastern population of sandhill cranes which contains more than 70,000 birds. Additionally, in Florida it is illegal to artificially feed whooping or sandhill cranes. Check with the appropriate regulatory agencies in individual states for a more comprehensive analysis of state laws.

Whooping cranes and some subspecies of sandhill cranes (Mississippi, Florida, and Cuban) also are protected under the Endangered Species Act (ESA). Under this statute, the wild migratory population of whooping cranes in central North America is fully protected anywhere it occurs in Canada or the U.S. The extant reintroduced populations, however, are classified as “experimental and non-essential” under the ESA. This classification provides more flexibility in dealing with management issues that occur during reintroduction efforts. The experimental, non-essential designation applies to whooping cranes in the EMP and in non-migratory populations of Louisiana and Florida.

Federal and state permits are required to capture and possess cranes or crane parts, such as feathers. The USFWS is responsible for all permits obtained under either the MBTA or the ESA. In at least some states, the USFWS, in close cooperation with USDA Wildlife Services, administers take permits for removing sandhill cranes involved in agricultural damage. State permits for the capture of cranes can be obtained through state natural resource agencies.

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Glossary

Diurnal: Active mainly during the day

Endosperm: The part of a seed that acts as a food source for the developing plant embryo.

Fledging: The stage of a bird's life when the wing feathers and muscles are sufficiently developed to enable flight.

Hallux: Posterior-oriented toe.

Omnivore: Eats both plants and animals.

Pyrotechnics: Flares or cartridges fired from a gun or launcher that produce a loud blast or scream accompanied by smoke and a flash of light.

Staging Area: During migration, a stopping point where birds rest and feed to improve body condition and increase body fat.

Key Words

Birds, Cranes, Consumption of planted seed, *Grus americana*, *Grus canadensis*, Diverters, Powerline collision, Sandhill cranes, Seed repellents, Territorial cranes, Whooping cranes

Disclaimer

Wildlife can threaten the health and safety of you and others in the area. Use of damage prevention and control methods also may pose risks to humans, pets, livestock, other non-target animals, and the environment. Be aware of the risks and take steps to reduce or eliminate those risks.

Some methods mentioned in this document may not be legal, permitted, or appropriate in your area. Read and follow all pesticide label recommendations and local requirements. Check with personnel from your state wildlife agency and local officials to determine if methods are acceptable and allowed.

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Appendix

Damage Management Methods for Sandhill and Whooping Cranes

Type of Control	Available Management Options
Exclusion	Not practical
Fertility Control	None registered
Frightening Devices	Propane cannons and associated pyrotechnics
Habitat Modification	Lure crops and artificial feeding
Repellents	9,10 Anthraquinone (AG), registered as Avipel®
Shooting	Only allowed for sandhill cranes; Requires state and federal permits
Toxicants	None registered
Trapping	Impractical in most situations; Requires state and federal permits

