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EAGLES

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EAGLES

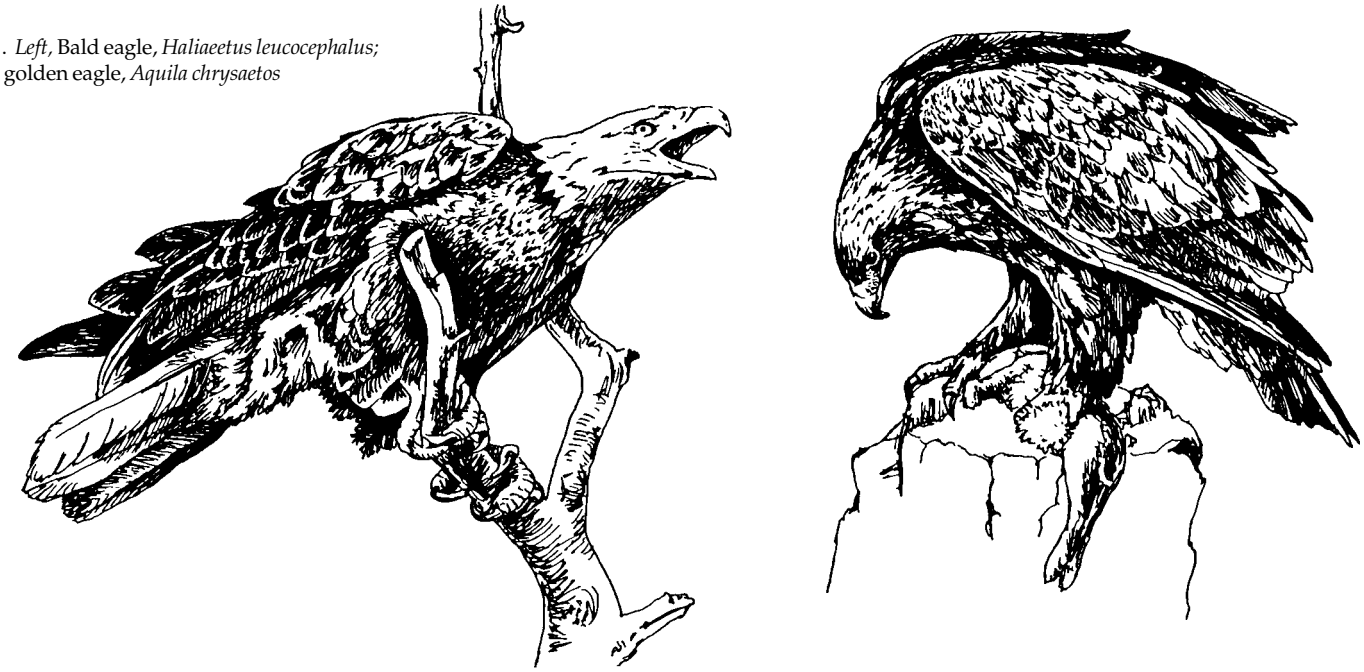


Fig. 1. *Left*, Bald eagle, *Haliaeetus leucocephalus; right*, golden eagle, *Aquila chrysaetos*

Damage Prevention and Control Methods

Exclusion

Keep livestock in buildings or in pens. Fences alone are ineffective.

Cultural Methods and Habitat Modification

Use brushy and wooded pastures to reduce exposure of livestock.

Increase human activity near sheep and goat herds—herding. Change lambing and kidding seasons.

Confine ewes in sheds during lambing and kidding periods.

Remove carrion (dead animals) in livestock pastures.

Frightening

Scarecrows may discourage eagles from using an area for a limited period of time, usually up to 3 weeks.

Guard dogs that are aggressive toward predators may repel eagles.

Hazing with aircraft has limited value and requires a written permit from the Director, US Fish and Wildlife Service (USFWS).

Repellents

None are registered.

Toxicants

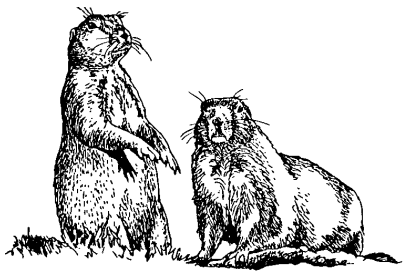
Toxicants are not permitted for eagle control.

Trapping and Snaring

Limited live capture and transplanting of eagles is conducted under permit by the USFWS or USDA-APHIS-Animal Damage Control.

Shooting

State and federal permits are required but are not issued.

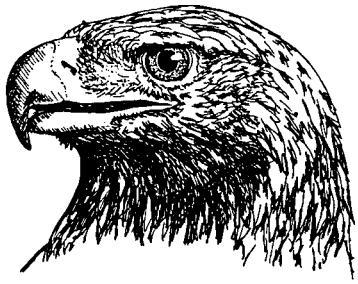


PREVENTION AND CONTROL OF WILDLIFE DAMAGE — 1994

Cooperative Extension Division
Institute of Agriculture and Natural Resources
University of Nebraska - Lincoln

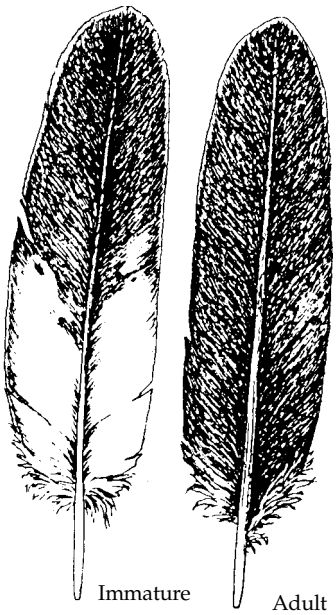
United States Department of Agriculture
Animal and Plant Health Inspection Service
Animal Damage Control

Great Plains Agricultural Council
Wildlife Committee

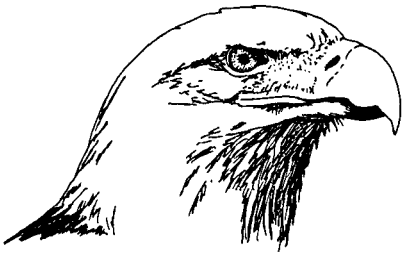


Adult golden eagle

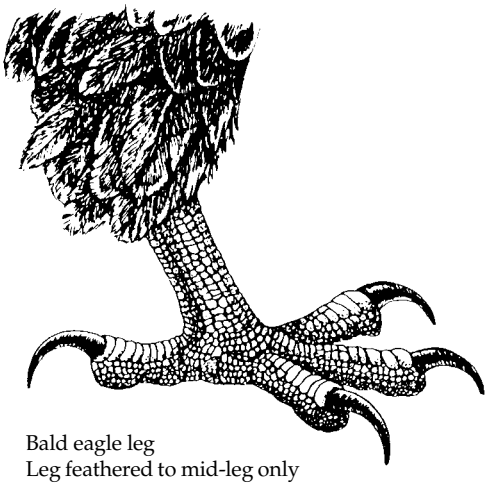
Golden eagle leg
Leg completely feathered



Golden eagle tail feathers



Adult bald eagle



Bald eagle leg
Leg feathered to mid-leg only

Fig. 2. Characteristics of golden and bald eagles.

Identification

Eagles are the largest bird of prey in North America. When hatched, eaglets have thick, light-colored down that is replaced with dark feathers within 5 to 6 weeks. Eagles have long sharp talons by which they capture and kill prey animals. The tarsi (lower legs) are feathered to the toes on golden eagles but are bare on bald eagles (Fig. 2).

Golden eagles weigh from 7 to 13 pounds (3 to 6 kg) as adults and have a wingspread of 6 to 7 1/2 feet (1.8 to 2.3 m); females are about one-third larger than males.

The plumage color of golden eagles changes with age. Birds in their first year are predominantly dark brown, with considerable areas of white on the underside of their wing flight feathers. The tail has a broad white band with a dark terminal band at the tip. The back of the neck may or may not appear gold or bronze, depending upon light conditions and the individual bird. This color is what gave the golden eagle its common name. Adult eagles are dark brown or bronze (Figs. 2 and 3).

Bald eagles weigh from 9 to 15 pounds (4 to 7 kg) as adults and have a wingspread of 7 to 8 feet (2.1 to 2.4 m). As in golden eagles, females are about one-third larger than males.

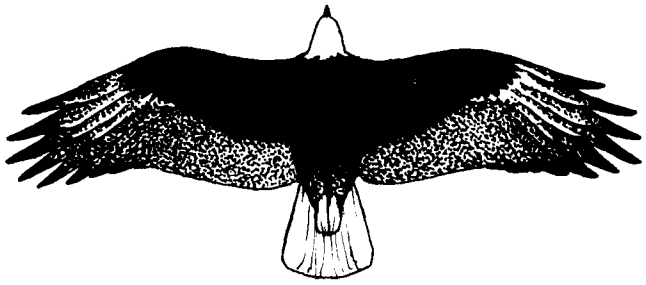
Bald eagle plumage color also changes with age. Juvenile bald eagles generally are mottled brown or nearly black and resemble adult golden eagles. These juveniles have no distinct white patches. Their tail and wings are mottled brown and white on the underside in contrast to the characteristic white patches under the wings and the white-banded tail of juvenile golden eagles. Although adult bald eagles of both sexes have the white head and tail, they do not develop these characteristics until they are 4 to 5 years of age or older (Figs. 2 and 3).

Range

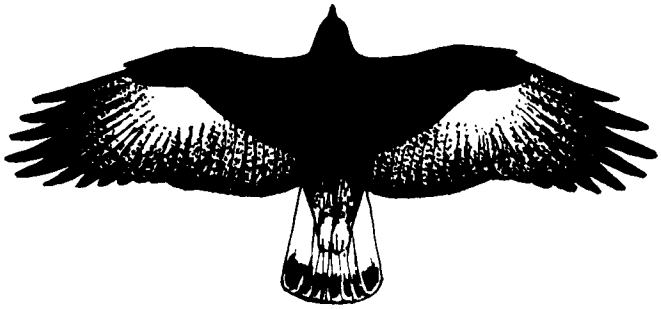
Golden eagles in North America occur in greatest numbers from Alaska southward throughout the mountain and intermountain regions of the West and into Mexico. They occur in lower numbers to the east across Canada, the Great Lakes states, and the Appalachian Mountains of the eastern United States.

Bald eagles have a similar range but tend to be most common near the seacoasts and other large bodies of water. In winter they may concentrate along

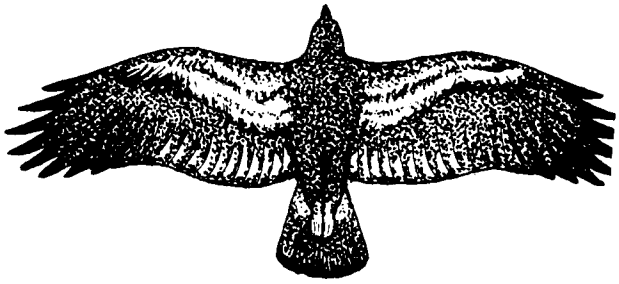
Adult golden eagle



Adult bald eagle



Immature golden eagle



Immature bald eagle

Fig. 3. Golden and bald eagles in flight.

major lakes and rivers. By far the greatest concentration of bald eagles is in Alaska, along large rivers and the coast.

Habitat

Eagles frequent a wide variety of habitats. Golden eagles seem to prefer the rough broken terrain of foothills and mountains, valleys, rimrocks, and escarpments. They commonly hunt the adjacent plains for food.

Bald eagles seem to prefer timbered areas along coasts, large lakes, and rivers, but they also occupy other areas.

Eagles often abandon habitat that is subject to intensive human activity and move to more remote areas.

Food Habits

Although regional and seasonal differences in food habits exist, golden eagle prey consists mostly of small mammals such as jackrabbits, cottontails, prairie dogs, and ground squirrels. A variety of birds and reptiles also have been recorded as prey. Nesting pairs or concentrations of juvenile birds can be a major cause of predation on local game bird populations. Golden eagles also readily eat carrion.

Golden eagles sometimes attack large mammals; deer and pronghorns of all ages have been observed being attacked or killed by eagles. Records also exist of bighorn sheep, coyotes, bobcats, and foxes being killed. Occasionally, golden eagles kill calves, sheep, or goats. However, attacks on animals that weigh more than 30 to 40 pounds (14 to 18 kg) are uncommon. Where golden eagles prey on domestic animals, they usually take lambs and kids, but some become persistent predators of domestic livestock as large as 500 pounds (227 kg).

Bald eagles rely heavily on fish and carrion where available. They readily adapt, however, to preying on waterfowl, other birds, rabbits, and other small mammals. They also occasionally kill adult deer, pronghorns, and calves. At times, some may prey repeatedly on domestic sheep and goats, primarily young lambs and kids.

Experiments with captive eagles indicate that adults require about 3/4 pound (1/3 kg) of meat per day to maintain their weight; young, growing eagles require much more food. Accounts of the weight that an eagle can carry in flight often have been misstated. Experiments indicate that without wind to assist them even large eagles cannot take off from flat ground with more than 5 or 6 pounds (2 to 3 kg) in their talons. Eagles flying into the wind and taking prey from hillsides, however, sometimes carry animals of twice those weights for considerable distances.

General Biology, Reproduction, and Behavior

Nesting Behavior

Eagle courtship displays consist of a series of "roller coaster" dives and other aerial maneuvers. These characteristic maneuvers may be seen nearly any time of the year, but are most common just before and during the late winter breeding season. Aerial displays made during other seasons may serve to identify territorial boundaries and maintain pair bonds between adults.

Eagle nests of sticks and twigs are built either on cliffs or in trees. Nests can be very large, sometimes up to 8 feet (2.4 m) wide and deep. The same nests may be used several years, becoming larger as new material is added each year. Eagles usually have several nests in a vicinity and may use alternate sites.

Nesting can begin as early as February in the south and as late as June in the north. At nesting time, an adult pair builds new nests or repairs old ones. Often, a single pair will build or repair two or three nests during a single season. These alternate nests are legally defined as "active" and are protected by law. The nesting territory of golden eagles varies from about 3 to 65 square miles (8 to 168 km^2) per pair.

Bald eagles seem less antagonistic to other nesting pairs, and their nesting territories, typically near water, may be much smaller. Studies in Alaska have shown that bald eagle nests may be spaced as closely as 1/4 mile (0.4 km) apart along rivers, with nesting territories as small as 30 to 40 acres (12 to 16 ha) in some cases. This may be due to more plentiful food near water.

Usually, 2 (1 to 3) white or mottled brownish eggs are laid after nesting behavior begins. The eggs hatch after a 35- to 45-day incubation period. Both adults hunt and secure food for the young, with the female doing most of the incubating, feeding, and brooding. Young eagles become strong enough to tear meat apart by 50 days of age. They are fully feathered and ready to leave the nest 65 to 70 days after hatching. Although the young are as large as the adult birds at this time, their parents may continue to provide them with food and protection for as long as 3 months after they leave the nest.

Not all eagle eggs hatch, and the death rate of young eagles, as in other birds of prey, is high. Young eagles are antagonistic toward each other and the stronger often kills or causes the weaker to die of starvation. Losses due to exposure, diseases, parasites, and predation occur while the young are still in the nest. Up to 75% of the young eagles die during their first year due to starvation, disease, and causes directly or indirectly associated with humans.

Illegal shooting, chemicals, trapping, and power line electrocutions account for a large number of eagle fatalities. Injuries resulting from accidents such as flying into power lines or being hit by vehicles while feeding on road-killed animals also occur.

Dispersal and Migration

Juvenile golden eagles leave the nesting territory as early as May in the Southwest and as late as October or November in the North. Many of the golden eagles that breed in the northern United States and Canada migrate south for the winter. They arrive in the southwestern United States as early as October and reach peak numbers in December and January in Texas and February and March in New Mexico before migrating back north. Only resident birds remain by late May. Golden eagles breeding in the more temperate climates south of Canada often remain in the same region year-round. Many northern golden eagles migrate through areas occupied by resident eagles to areas farther south.

Bald eagles usually are found in coastal areas, along lakes and rivers, and on mountain ridges. Usually, they are seen soaring or sitting on commanding snags along bluffs or shores. Pairs sometimes are observed together. After the nesting season, they may congregate in areas where food is more readily available, and then large numbers may roost in the same tree. Immature birds also may roost together during the winter.

Bald eagles will winter as far north as open water and food are available, migrating out of more northerly nesting areas. Returns from banded bald eagles indicate that birds that nest in Florida often migrate to the northeastern states and southern Canada in midsummer and return in early fall. Returns from birds banded in Saskatchewan indicate that some move as far south as Texas and Arizona.

Eagle Populations

Research indicates that golden eagles are maintaining static populations in areas undisturbed by humans. The wintering population south of Canada is estimated at 63,000 birds. Aerial surveys conducted by the USFWS in 12 western states show average densities of about 10 golden eagles per 100 square miles (4/100 km^2) in midwinter study areas. Golden eagles also winter in parts of Alaska, Canada, and Mexico; however, the number in this latter group would not likely exceed 10,000 birds.

Current population survey information indicates a sizable and healthy population of golden eagles in the western states. The current breeding population for 17 western states is estimated at 17,000 to 20,000 breeding pairs. Information indicates a slight decline in the western population as a whole, with drastic declines in some specific areas associated with increased human activity.

Bald eagles occur across the continent from northern Alaska to Newfoundland, and south to southern Florida and Baja California. They are found on Bering Island and the Aleutian Islands. Two subspecies are recognized: the southern bald eagle (*H. l. leucocephalus*) and the northern bald eagle (*H. l. alascans*). The primary difference in appearance is size, the northern race being larger and heavier. There is a gradual increase in size from south to north.

The northern bald eagle population in Alaska is estimated at 35,000 to 40,000. In 1989, the breeding population of bald eagles in the continental United States (excluding Alaska) was estimated to be about 2,673 pairs. This estimate included both races. The nationwide January eagle count sponsored by the National Audubon Society indicated about 3,700 birds each year from 1961 through 1966. The annual midwinter counts coordinated by the National Wildlife Federation since 1979 have ranged from about 9,000 birds to more than 13,000 in the contiguous 48 states. In 1989, 11,610 bald eagles were counted in key wintering areas. The 1989 count does not represent a comprehensive national count, so it is not directly comparable to earlier counts. These January counts indicated four areas of greatest abundance nationwide: the upper half of the Mississippi Valley, the Northwest (Washington, Oregon, Idaho, and Montana), Florida, and the Chesapeake Bay area.

Damage and Damage Identification

Golden eagles are more likely to prey on livestock than are bald eagles. Both species readily feed on livestock carrion and carcasses left by foxes and coyotes, although some individuals prefer live prey to carrion. Eagles are efficient predators and can cause severe losses of young livestock, particularly where concentrations of eagles exist. Generally, they prey on young animals, primarily lambs and kids, although they are capable of killing adults. Eagles also take young deer and pronghorns, as well as some adults.

Eagles have three front toes opposing the hind toe, or hallux, on each foot. The front talons normally leave wounds 1 to 3 inches (2.5 to 7.5 cm) apart, with the wound from the hallux 4 to 6 inches (10-15 cm) from the wound made by the middle front talon. On animals the size of small lambs and kids, fewer than four talon wounds may be found, one made by the hallux and one or two by the opposing talons. Talon punctures typically are deeper than those caused by canine teeth and somewhat triangular or oblong. Crushing between the wounds usually is not found, although compression fractures of the skulls of small animals may occur from an eagle's grip. Bruises from their grip are relatively common.

Eagles seize small lambs and kids anywhere on the head, neck, or body, frequently grasping from the front or side. They usually kill adult animals, or lambs and kids weighing 25 pounds (11 kg) or more, by multiple talon stabs into the upper ribs and back. Their feet and talons are well adapted to closing around the backbone, with the talons puncturing large internal arteries, frequently the aorta in front of the kidneys. The major cause of death is shock produced by massive internal hemorrhage from punctured arteries or collapse of the lungs when the rib cage is punctured. Eagles also may simply seize young lambs, kids, or fawns and begin feeding, causing the prey to die from shock and loss of blood as it is eviscerated.

Eagles skin out carcasses, turning the hide inside out while leaving much of the skeleton intact, with the lower legs and skull still joined to the hide. On very young animals, however, the ribs often are neatly clipped off close to the backbone and eaten. Eagles frequently do not eat the breast bone, but some clip off and eat the lower jaw, nose, and ears. Quite often, they remove the palate and floor pan of the skull and eat the brain. They may clean all major hemorrhages off the skin, leaving very little evidence of the cause of death, even though there may be many talon punctures in the skin. Ears, tendons, and other tissues are sheared off cleanly by the eagle's beak.

Larger carcasses heavily fed on by eagles may have the skin turned inside out with the skull, backbone, ribs, and leg bones left intact, but with nearly all flesh and viscera missing. The rumen normally is not eaten. Eagles may defecate around a carcass, leaving characteristic white streaks of feces on the soil. Their tracks may be visible in soft or dusty soil. Small downy feathers often are evident on vegetation where eagles have fed.

Legal Status

Both bald and golden eagles and their nests and nest sites are protected by the federal Bald Eagle Protection Act and state regulations. In June 1940, legislation was passed that outlawed killing, possessing, selling, or trading any live or dead bald eagle, or any part of a bald eagle, including feathers, eggs, and nests. In 1962, the same protection was afforded the golden eagle. Provisions in these laws allow specific permits to be issued by the US Department of Interior for the taking of eagles or their parts for scientific research, for exhibitions and Indian religious purposes, and for control of predation to domestic livestock (50 CFR, Part 22). Permits for control of eagles to prevent or reduce predation on livestock, however, have not been issued by the US Department of Interior since 1970. Also, regulations promulgated by the Secretary of Interior under authority of the Endangered Species Act of 1973 (as amended) prohibit "taking" of an endangered species, such as bald eagles. Because golden eagles also are protected, they too cannot be "taken." Congress has defined the term take as follows: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

A depredation permit from the US Department of Interior is required to carry out any eagle damage control activities. This requires a formal consultation and biological assessment under Section 7 of the Endangered Species Act for bald eagles. At present, permits to take, harass, or scare depredating golden eagles are issued routinely to the western Regional Director of the USDA-APHIS-ADC by the USFWS. Only USDA-APHIS-ADC personnel are permitted to engage in eagle damage control activity under such permits.

Damage Prevention and Control Methods

Exclusion

Eagles rarely attack livestock around buildings or pens. Therefore, livestock confined in buildings or pens of 1 to 2 acres (1/2 to 1 ha) usually are safe from eagles. Fences, however, are no constraint to eagles; livestock must be protected by other means.

Cultural Methods and Habitat Modification

A common practice for many sheep and goat producers is to avoid use of pastures where predation is severe until lambs and kids are several weeks old. This practice may reduce exposure of individual flocks or herds to predation, but it is not always effective. It may, however, cause predators to shift their attention to livestock owned by other operators.

Eagles prefer relatively open areas in which to take their prey. Lambs and kids are much less vulnerable to eagle predation in brushy and wooded areas. While use of such pastures may not completely prevent eagle predation, it may help to protect lambs and kids up to 4 to 6 weeks of age. Predation by eagles is seldom a problem after lambs and kids have reached 6 weeks of age.

Herding of livestock, where feasible, usually will reduce eagle predation because humans tend to frighten eagles. Herding may be only partially effective, however, because eagles, like other predators, adapt to existing conditions.

Shifting the lambing and kidding seasons to an earlier or later period may also help to reduce or prevent eagle predation, but the decision must be based on the availability of pasture, plant phenology, season and weather, availability of labor, marketing constraints, and other considerations. In some areas, such a shift may cause increased exposure of young livestock to other predator species.

Shed lambing and kidding is effective in preventing eagle predation during the confinement period. Its limitations include the availability of space, the quality and costs of feed necessary to ensure and maintain milk production for lambs and kids, and the length of confinement. Unless the young are confined up to a month or more, shed lambing and kidding will provide protection when the chance of eagle predation is lowest. Eagles generally take older lambs or kids that are running and playing some distance from flocks, not the younger ones, who usually stay close to their mother and within the flock. Predation is most severe on young that are at least 2 to 4 weeks of age. Confinement of sheep and goats also may be a very costly management decision for forage utilization where high quality forage is available in pastures and weather does not present a constraint to the use of that forage.

Carrion removal may help limit the size of local eagle populations. Eliminating the eagles' food source may force a potential problem to move elsewhere. It may, however, encourage the eagles to kill lambs or kids. If eagles depend heavily on carrion in an area where young livestock are to be protected, the eagles must either have an alternate food source or be persuaded to move.

Frightening

Little information is available on the effects of guard dogs to prevent eagle predation. Some dogs, including breeds other than guard dogs, will chase birds. They would probably be more effective in protecting sheep or goats in small pastures than in large pastures and open range conditions, particularly where livestock are spread over large areas.

Sonic devices have been tested and show little benefit in preventing or reducing eagle predation.

Scarecrows, made from 2 x 4-inch (5 x 10-cm) lumber and chicken wire (Fig. 4) and dressed in pants or skirts, shirts, and hats, may keep eagles away from an area for up to 3 weeks. The chicken wire bodies allow the arms to wave in the wind. Clothes can be purchased secondhand from Goodwill Industries for about $3.50 per scarecrow. The frame is made of standard grade lumber at a cost of about $6.50 per scarecrow; a lesser grade or scrap lumber should reduce the cost. Almost anything can be used as a stand, including 2 x 4s or existing fence posts. The chicken wire is attached to the 2 x 4s with a staple gun, which also comes in handy for making field repairs. Building time is about 1/2 hour. Fluorescent orange paint can be sprayed on the backs and chests of scarecrows and their arms hung with shiny pans to increase visibility. Erect scarecrows on a high ridge or point, where sheep and goats usually bed. Most eagle predation occurs about sunup so the lambs or kids will be close to the scarecrows during the time of greatest danger. When eagles start to habituate to scarecrows, harass them by shooting cracker shells near perched or low-flying eagles. This activity will reinforce the fear associated with humans and scarecrows. A permit is required for such harassment. In areas where ravens are common and preying on lambs or kids, shooting or shooting at ravens keeps eagles wary of scarecrows; again, a permit is required for this activity.

Repellents

No repellents are registered or effective in reducing eagle predation.

Toxicants

No toxicants are registered or permitted for use in preventing or controlling eagle predation.

Trapping, Snaring, and Shooting

Trapping, snaring, or shooting eagles is illegal, except by permit. Regulations permit the Director, USFWS, to issue permits for removal of depredating eagles "under permit by firearms, traps, or other suitable means except by poison or from aircraft." However, by policy of the Secretary, US Department of Interior, such permits are not issued. The sole exception is very limited live-trapping or net-gunning from a helicopter and transplanting of

Materials:

a. 2" x 4" x 20"
b. 2" x 4" x 24"
c. 2" x 4" x 16"
d. 2" x 4" x 30"
e. 5' x 1 1/2" diameter steel pipe
f. 18" trap stake
g. 1/4" x 4" x 12" steel

Building time: 1/2 hour.

The frame was made of standard grade lumber at a cost of $6.50 per scarecrow; lesser grade or scrap lumber should reduce the cost. Use 2 x 4s or existing fence posts for the stand. A staple gun can be used to attach the chicken wire to the 2 x 4s.

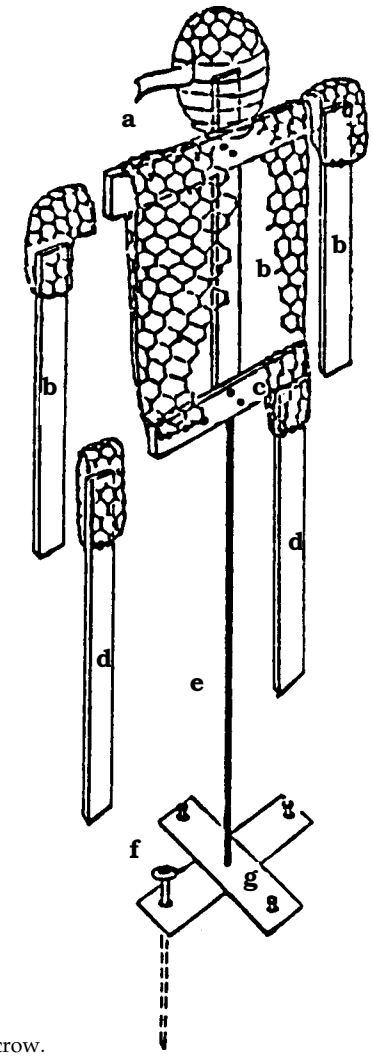


Fig. 4. Construction details of an effective scarecrow.

eagles by USFWS and USDA-APHIS-ADC personnel. Livestock owners who have, or suspect that they have, eagle depredation should contact the USFWS or USDA-APHIS-ADC for assistance and evaluation. Live trapping and removal of depredating eagles by the USFWS is permitted under certain conditions, and a limited amount of such control is carried out. Net gunning from a helicopter allows quick and selective removal of depredating eagles from an area.

Economics of Damage and Control

Although eagles may benefit producers by preying on rodents and rabbits and feeding on carrion, they may have a major adverse impact on individual producers by preying on young lambs, kids, exotic game species, and other game animals. Losses are most severe where nesting eagles prey repeatedly on the same flock or where migrant eagles concentrate in an area and cause major losses over a short period of time.

Whether eagle damage control is necessary and beneficial depends on the levels of loss, the costs of control, and the effectiveness of control efforts for each damage situation. The severe restrictions on the application of any type of eagle control and the long delays in securing the necessary permits and/or assistance from the US Department of Interior are major constraints to the protection of livestock.

Acknowledgments

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Figure 1, bald eagle, from Charles W. Schartz, *Wildlife — Drawings*, 1980, Missouri Department of Conservation, Jefferson City, p. 53, adapted by Emily Oseas Routman; golden eagle by Emily Oseas Routman.

Figures 2 and 3 by Emily Oseas Routman, adapted from Susan Brooke *in* US Fish and Wildlife Service and Texas Agricultural Extension Service (no date), and from Grossman. M.L. and J. Hamlet (1964), *Birds of Prey of the World*, C.N. Potter, New York, 496 pp.

Figure 4 by Daniel B. Pond (1984), Montana Cooperative Wildlife Research Unit, University of Montana, Missoula.

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