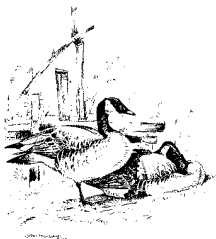


A Landowner's Guide to Common North American Predators of Upland-nesting Birds



Jack H. Berryman Institute for Wildlife Damage Management,
International Association of Fish and Wildlife Agencies,
and
National Fish and Wildlife Foundation



The Berryman Institute



A Landowner's Guide to Common North American Predators of Upland-nesting Birds

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1997

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This publication provides information designed to increase the reader's basic understanding of predator/prey interactions and the biology and ecology of common North American predators of upland-nesting birds, their nests, and young. We also discuss the potential impacts of these predators on upland-nesting bird populations. By understanding the biology and ecology of predators, the reader will be better prepared to make informed management decisions about how to enhance local upland-nesting bird populations. Information regarding specific techniques that can be used to manage common predators of upland-nesting birds, can be found in an accompanying publication entitled, "*A Landowner's Guide to Managing Common Predators of North American Upland-nesting Birds.*"

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Funding for this publication was provided by the National Fish and Wildlife Foundation, the International Association of Fish and Wildlife Agencies, the Jack H. Berryman Institute, and a U.S. Fish and Wildlife Service, Division of Federal Aid, Wildlife Restoration Grant.

This publication can be cited as:

Messmer, T. A., M. R. Conover, R. D. Dueser, P. W. Klimack, and C. E. Dixon.
1997. A landowner's guide to common North American predators of upland-nesting birds. Berryman Institute Publication No.13, Utah State Univ. Logan.
24 pp.

INTRODUCTION

The Prey

Upland-nesting birds are those bird species that typically nest on the ground (Figure 1). Although most upland-nesting birds nest directly on dry ground, some will nest on floating or standing vegetation located over water. Some upland-nesting birds, such as snow geese (*Chen caerulescens*), and gulls (*Larus spp.*) prefer to nest in large colonies on open shorelines or islands, forsaking concealment for safety in numbers. By nesting in colonies, an

individual bird increases the odds that a predator entering the colony will prey on young other than its own.

Smaller upland-nesting birds, such as the common nighthawk (*Chordeiles minor*), prefer to nest on bare ground. The size and coloration of the female, her eggs, and nest afford nesting nighthawks excellent concealment. Other upland-

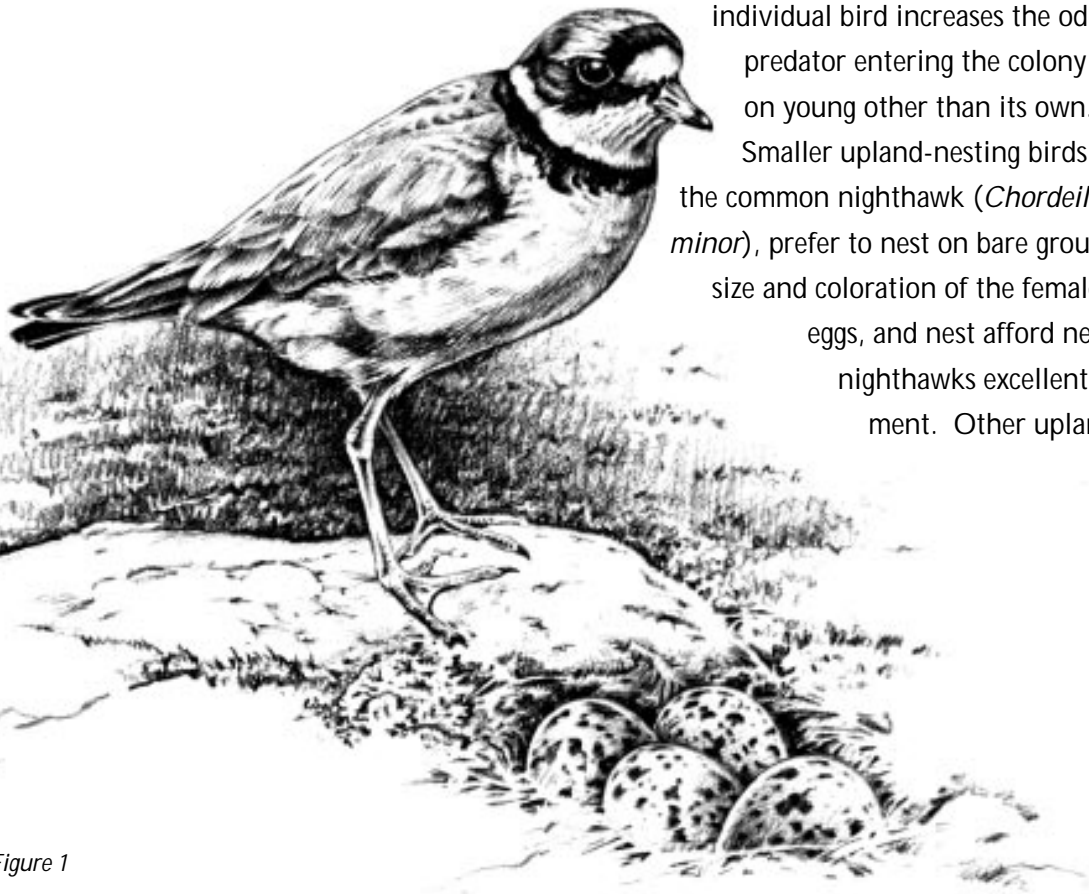


Figure 1



Figure 2

nesting birds such as the mallard (*Anas platyrhynchos*), select nest sites concealed by tall, dense vegetation (Figure 2).

Nest site selection is governed primarily by the need to avoid predation. Upland-nesting birds employ other adaptations to increase their chances of raising young. These adaptations include anti-predator behavior (e.g., feigning injury), cryptic or camouflage coloration of the females, and the ability to renest if their first nests are destroyed (Figure 3)



Figure 3

The Predators

Evolution has adapted predators to seek prey which provide them with highest returns (in terms of calories and nutrients) for the least expenditure of time and energy. Some predator species employ unique hunting strategies, designed to capture specific prey. Others are opportunistic, taking any prey encountered during the course of daily activities. This publication discusses the ecology of some common North American mammalian and avian predators that can impact avian populations. Other predators not discussed in this publication also will prey on upland-nesting birds, their eggs, and young.

Predator/Prey Dynamics

When people think of predation, they often visualize a cougar, wolf, or other large carnivore, killing a deer or elk (Figure 4). In reality, literally thousands of acts of predation (such as a bird eating an insect) occur for each instance of a cougar killing a deer. (Figure 5) Even the large predators kill and eat many more small prey for each large animal taken.

The popular belief that predators only kill young, old, sick, and injured animals, thus keeping prey in balance with their habitat, is not entirely true. In natural systems, predator and prey numbers may tend to cycle together. However, few truly natural systems remain. Human activities that alter original habitats have tended to favor some animals at the expense of others. If these activities favor a predator by providing it with alternate food sources or cover during some critical period, predator numbers will increase, and this may result in a greater impact on their prey species.

Predators are less abundant than the prey species they pursue. For example, in a given area, the predator community may include one coyote, two great-



Figure 4

horned owls, and two red-tailed hawks. In this same area, the potential prey base may consist of 100 rabbits, 2,000 birds, and as many as 25,000 mice. In a "balanced" system, when prey numbers decrease, predator numbers would also be expected to decline. However, problems may arise if predators increase in response to abundant alternate food sources. In this situation, preferred populations of prey species may be held at unusually low densities by predators. If prey populations are not able to respond to improved habitat conditions because of predators, the situation is referred to as a "predator pit."

Weather and climate can also affect the physical condition and vulnerability of the prey, thus impact population density, reproductive potentials, and susceptibility to disease. Probably the most important statistic used to determine the impact a predator has on a prey species is the percent of the prey population taken by a specific predator. By knowing this information, managers can implement appropriate strategies to maintain predator and prey species populations in balance with the local habitat conditions.

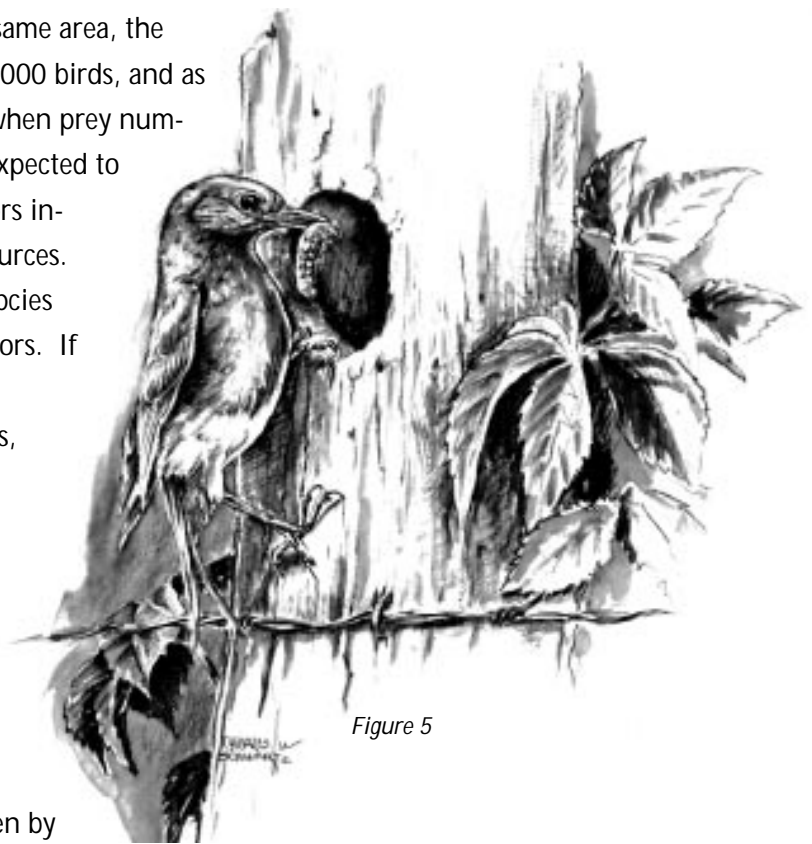


Figure 5

Impacts of Predation on Upland-Nesting Birds

Predators can impact upland-nesting bird population in several ways. Adult males and nesting females are preyed upon by a variety of avian (eagles, hawks, owls)(Figure 6),

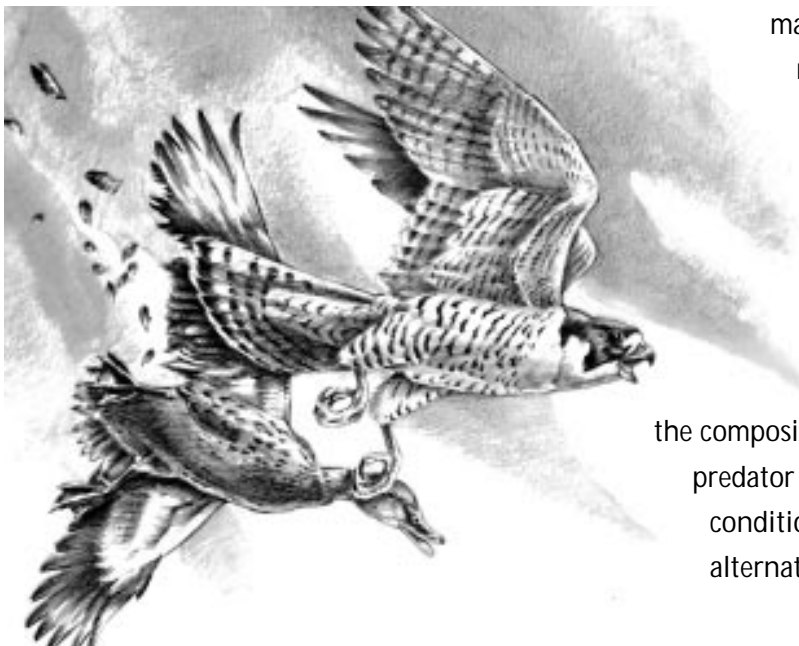


Figure 6

mammalian (coyotes, skunks, raccoons, squirrels), and reptilian (snakes) predators. Predators also eat the young and eggs. However, the actual impact of predation on upland-nesting birds ultimately depends on

the composition and density of the predator community, habitat conditions, and the availability of alternate food sources.

Breeding Bird Biology, Habitat Use, and Predation

Upland-nesting bird populations increase under favorable habitat conditions and decrease when conditions deteriorate. Generally upland-nesting birds that select nest sites in narrow strips of cover, such as those found around wetlands in plowed fields and along roads, are less successful due to higher predation rates than those situated in large blocks of continuous cover.

Upland-nesting bird populations are highest at the end of the reproductive season (late spring or early summer), then decline to yearly lows, which occur just prior to the next reproductive season (Figure 7). Predation may help to moderate population peaks and lows. However, if predator populations are high, upland-nesting bird populations may decline and remain depressed. Current research suggests that in altered habitats, predators can maintain upland-nesting birds at population levels which are lower than what would otherwise occur. For mallards, over-winter female survival of greater than 30% and nest success of greater than 15% may be necessary to maintain local upland-nesting bird breeding populations. In areas where female survival and nest success are low, mammalian predators, such as the red fox (*Vulpes vulpes*), which prey directly on nesting females, can have the greatest impact on bird populations.

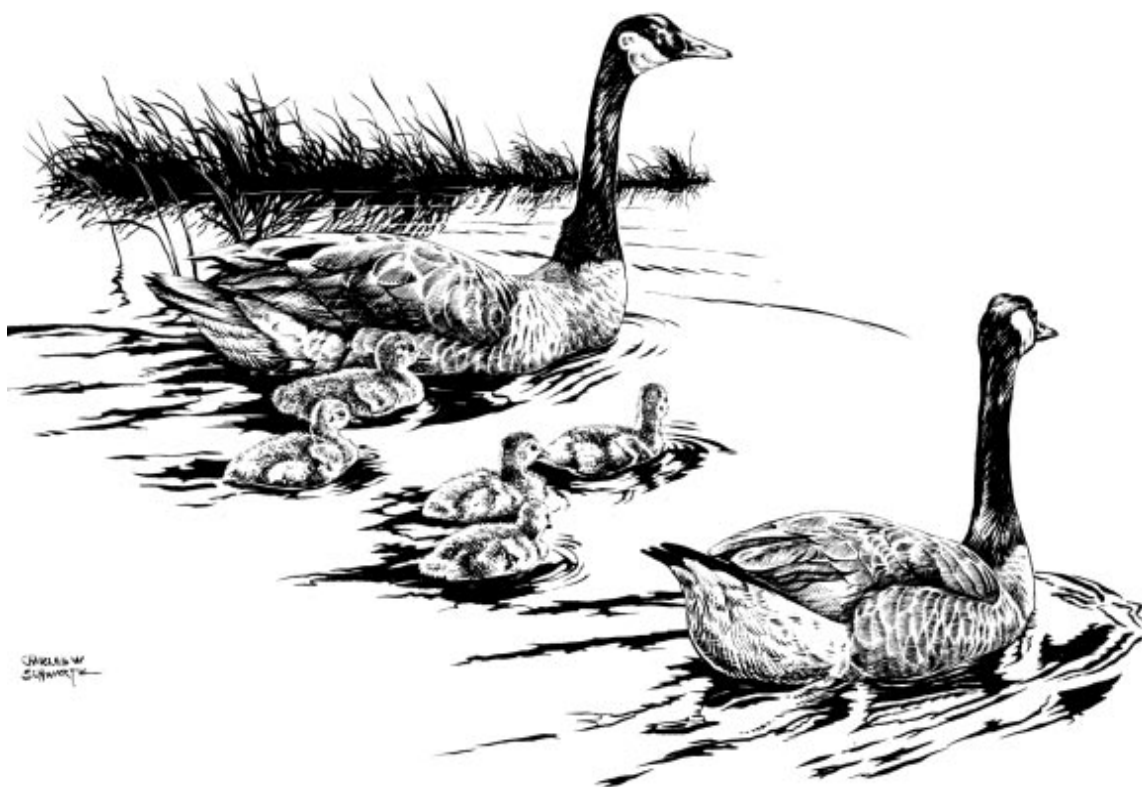


Figure 7

BIOLOGY AND ECOLOGY OF MAMMALIAN PREDATOR

CANIDS

Coyote (*Canis latrans*)

Coyotes resemble small "collie" dogs in body form and size (Figure 8). The color of the fur of the upper body is generally gray or reddish-gray with the underparts being a lighter yellowish. A coyote's coloration may vary by geographic location. Adult coyotes may exceed 50 inches in length and weigh over 50 pounds. Males are larger than females. The body and muzzle are slender, the ears small, pointed, and erect, and the tail is bushy. When running, coyotes carry their tails low. This characteristic helps distinguish them at a distance from domestic dogs and wolves.

Coyotes are monogamous. A male coyote will pair and mate with only one female during a breeding season that lasts from January to March. Pups are born around 60 days later in a den constructed by the female. Den sites may consist of riverbanks, sloping hillsides, caves, and open areas. The female may dig her own den or enlarge an abandoned skunk or fox den. Dens usually have more than one entrance. A pair of coyotes will raise one litter per year ranging in number from 1 - 19 pups (averaging 6). Both parents and other adults associated with the pair hunt to feed the young. For the first 5 - 6 weeks, pups spend most of their time in or near the den.

Coyotes are highly adaptable and are found throughout North America. Coyotes defend territories that are large enough to provide adequate food for themselves and their young. Hence, territory size varies inversely with the quality of the habitat. A coyote may travel 15 miles each night hunting and patrolling its territory.

Coyotes are most active at night, beginning their activities around sunset. They are opportunistic feeders, primarily taking food as it is encountered. The coyote's diet may include rabbits, squirrels, insects, reptiles, upland-nesting birds, eggs, fruits, and carrion. Occasionally they kill larger animals such as deer, pronghorns, and domestic livestock.

Although coyotes prey on upland-nesting birds, their eggs, and young, they are considered to be a lesser threat than other medium-sized mammalian predators. In fact, the presence of coyotes may actually enhance upland-bird nesting success by eliminating other potential predators in an area. However, in areas where coyotes densities are high, they can reduce upland-nesting bird success.



Figure 8

Red Fox (*Vulpes vulpes*)

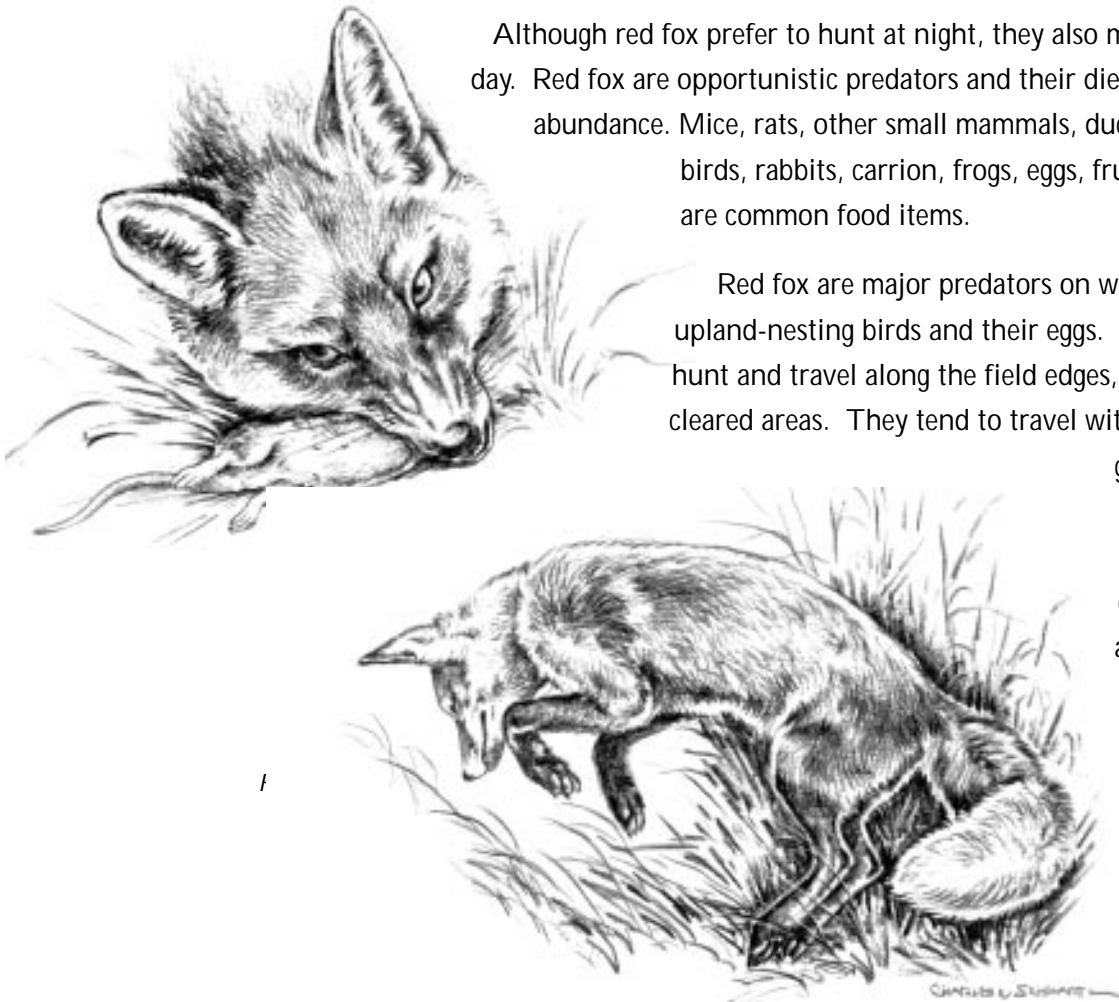
Red fox occur throughout much of North America. Adult red fox may weigh up to 12 pounds. Fur color ranges from yellow to orange while the lower portion of the legs and feet are normally black. Red fox have long, bushy tails with a white tip, erect ears, pointed noses, and long legs (Figure 9).

Adult male red fox mate with one female during the breeding season which occurs in late January to March. After a gestation period of 52 days, a litter of 4 - 9 pups are born in a den. The female red fox may excavate her own den or use abandoned woodchuck burrows, spaces beneath old buildings, caves, hollow logs, or other suitable sites. A single litter is produced annually and both adults care for the young. Fox pups stay close to the den until they are weaned. At approximately 9 weeks of age they begin to accompany the adults on hunting trips. Red fox pups are usually full-grown by autumn and leave the family group prior to winter.

Red fox spring and summer activities are centered around the pup-rearing dens. Home range size for red fox may vary from less than one up to 10 square miles. The size of the home range is dependent on prey availability and the presence of other competitors, namely coyotes and other red fox pairs.

Although red fox prefer to hunt at night, they also may be active during the day. Red fox are opportunistic predators and their diets reflect local prey abundance. Mice, rats, other small mammals, ducks, upland-nesting game birds, rabbits, carrion, frogs, eggs, fruits, insects, and berries are common food items.

Red fox are major predators on waterfowl and other upland-nesting birds and their eggs. Red fox may prefer to hunt and travel along the field edges, trails in the woods, and cleared areas. They tend to travel with their noses to the ground searching for scent. When prey is detected, fox attempt to determine its location and capture it without a chase. This mode of hunting makes red fox efficient predators of upland-nesting birds.



Domestic and Feral Dogs (*Canis familiaris*)

Domestic dogs that are allowed to roam freely can negatively impact local populations of upland-nesting birds (Figure 10). This impact may be magnified if the dogs have been bred to hunt birds. Feral dogs are dogs that have left the domestic life and adopted wild habits and habitats. To survive, feral dogs become predators. Although similar in appearance to domestic dogs, feral dogs avoid human contact. Feral dogs often travel in packs of 6 - 8 members. The breed of dogs within the pack may vary, but the pack leader is generally a large, more aggressive breed. Packs may travel more than 6 miles per day. Some packs have seasonal home ranges. In warm seasons, moist floodplain habitats may be preferred while in cooler seasons upland habitats are used.

Feral dogs can reproduce any month of the year. Females give birth in dens to a litter of 3-6 pups. Feral dog dens can be found under abandoned buildings and junk piles. Abandoned fox or coyote dens also are used. The pups may be raised by more than one member of the pack.

Feral dogs are usually active at night. A large portion of their diet comes from garbage dumps and scavenging on road-kills and other carrion. Other food includes mice, rabbits, songbirds, game birds, and insects. They rarely kill larger game. Domestic and feral dogs may harass, injure, and kill domestic livestock.

Dogs generally hunt by randomly searching cover, flushing concealed animals, then attempting to run down the fleeing prey. Thus, upland-nesting birds generally escape to renest and only the clutch of eggs is lost. However, a pack that has become efficient at nest predation could have a significant impact on local bird populations.

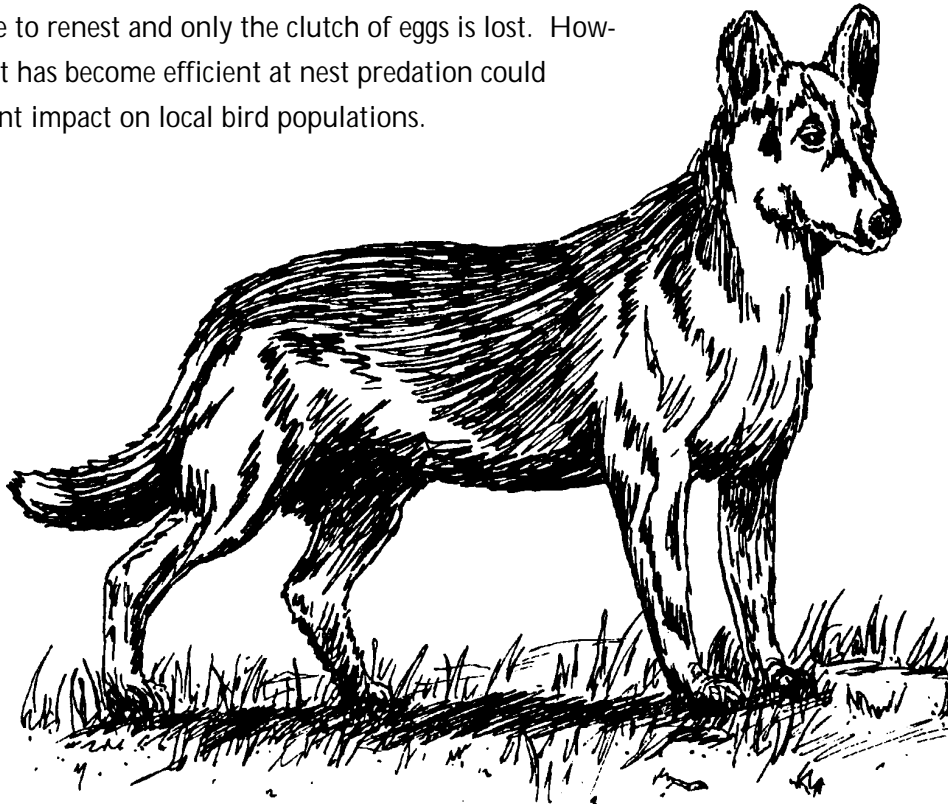


Figure 10

FELIDS

Domestic and Feral Cats (*Felis catus*)

Domestic house cats who are allowed to roam freely are efficient bird predators, as are feral cats (Figure 11). Feral cats are house cats that have left the company of humans to live in the wild or were born in the wild. Adult feral cats may weigh up to 8 pounds and stand 12 inches high at the shoulder. Colors are extremely variable. Feral cats avoid contact with humans.

Feral cats can raise litters throughout the year. Females have the potential to produce up to 3 litters of 2 - 10 kittens each per year when food is abundant. Den sites may be located under old buildings, straw and hay piles, and in hollow logs.

Feral cats are territorial and may defend a territory up to a square mile in size. Although, they are most active at night, they also may hunt during the day. Because of their ability to climb, they are able to access nests located in trees, nest boxes, and structures.

The impact of domestic cats on wild bird populations is tempered because they do not to rely solely on predation to supply their food. However, domestic and feral cats prey on songbirds, game birds, small rodents, and other small animal. Scientists estimate that one cat on the average will kill 7 - 8 birds per year. Thus, the estimated 64 million domestic cats in North America, and their feral counterparts, may kill in excess of 500 million birds each year.



Figure 11



Figure 12

MUSTELIDS

Badger (*Taxidea taxus*)

Badgers are carnivores that spend the majority of their time underground. They have flat bodies, short bowed legs, and large claws on the front feet (Figure 12). These front feet are well adapted for digging. Badgers have shaggy gray to brown fur, small ears, a short neck, and a white stripe that runs from the shoulder to the slightly upturned nose. The cheeks are white with black fur patches. Sexes are colored identically, however, males are larger than females. An adult male badger may weigh up to 25 pounds and reach 35 inches in length.

Adults badgers may mate with more than one partner during the breeding season. Although breeding occurs in August, the young (2 - 5) are born the following March or April due to delayed implantation (the embryo does not implant into the uterine wall until approximately February). Young badgers are weaned in June and by late summer are capable of foraging on their own. The female excavates the den in preparation for the birth of her young. A large mound of earth generally surrounds the entrance to a badger den.

Badgers are solitary animals that can be found throughout North America. They are most common on sandy soils that support an abundance of burrowing rodents. Badgers are good swimmers and will immerse themselves on hot days to cool off. Although badgers do not hibernate, they become inactive during extreme cold.

Badgers usually hunt at night, spending most of the daylight hours underground. They obtain most of their food by excavating rodents from their burrows. Badgers eat mice, ground squirrels, rats, chipmunks, snakes, carrion, and birds. Because birds are a secondary food source, badgers are seldom considered to be a major predator impacting upland-nesting birds. However, in local areas, badgers can destroy most upland-nesting bird nests contained within their home range.

Mink (*Mustela vison*)

Mink are members of the weasel family. They have long slender bodies with rich, uniform brown to black fur and a white spot under the chin. An adult male may weigh up to 3 pounds and be 28 inches long. Females are generally smaller than males (Figure 13).

Male mink may mate with several females during their January-March breeding season. Their gestation period ranges from 39 - 76 days, with some variation due to delayed implantation. Females give birth to one litter numbering from 3 - 6 young per year. The young are born in dens, generally April through June. Den sites may include dirt or rock piles, hollow logs and trees, bank burrows, and abandoned muskrat houses. The young are weaned at 6 weeks of age, but remain with the female for an additional 5 months before leaving the family group.

Mink are most active at night. They are found throughout North America except the treeless north, the southwestern portion of the United States, and Mexico. Mink are usually found around permanent and semi-permanent streams and wetlands that contain adequate vegetative cover. Mink are excellent swimmers.

Mink maintain hunting territories and defend them against other mink. Adult males have larger home ranges than females. Males may travel far beyond their normal territory during the breeding season and tend to be found around larger bodies of water than females. Mink do not hibernate, but they may become inactive during periods of extreme cold and heavy snowfall.

The tendency for mink to kill more than they eat at a given time (surplus killing) increases the likelihood that they will negatively impact local populations of upland-nesting birds. Mink kill their prey by biting the neck. One of its primary food items, the muskrat, is typically caught and killed in the water. Mink will also eat mice, rabbits, fish, reptiles, eggs,

insects, crustacea, and birds. Mink also are able to exploit overwater nests and islands that are not readily accessible to other mammalian predators. Thus, they may pose a significant threat to colonies of island-nesting birds.



Figure 13

Weasel (*Mustela spp*s)

Weasels are small animals with long slender bodies, short legs, small heads, and rounded ears (Figure 14). There are 3 species of weasel native to North America, the long-tailed weasel (*M. frenata*), the short-tailed weasel or ermine (*M. ermenia*), and the least weasel (*M. nivalis*). Long-tailed and short-tailed weasels have a black tip at the end of the tail that is absent on the least. Adult long-tailed weasels may be 24 inches long and weigh 12 ounces, short-tailed weasels weigh up to 6 ounces and are 13 inches long, and least weasels rarely exceed 8 inches in length and weigh 2 ½ ounces. The tail is 33 percent of the body length in the short-tailed and 44 percent of the body length in long-tailed weasels. In winter, the fur turns completely white except for a black-tipped tail in long-tailed and short-tailed weasels. Males and female weasels are identical in appearance, although the males are larger.

Male weasels may mate with several females during the summer breeding season. However, because of delayed implantation, their young are not born until the following spring. Both long-tailed and short-tailed weasels produce one litter per year while the least weasel may produce two or three litters annually. Litters generally contain 4 - 8 offspring that remain in or close to the den for one month. Weasel dens consist of rock crevasses or are found under old buildings, in hollow logs, or in burrows.

Long-tailed weasels are found from Mexico to extreme southern Canada. The short-tailed and least weasels inhabit areas in the northern United States to Alaska and Canada. Because weasels require free water, they are often found near wetlands or other water areas.

Weasels eat a wide variety of animal foods. Their diet includes mice, shrews, rabbits, rats, upland-nesting birds, eggs, and young birds. Although they will kill adult birds and destroy their nests, they rarely have a major impact on populations of upland-nesting birds. If prey is abundant, a weasel will kill more food than it needs, then cache the excess to be eaten later.

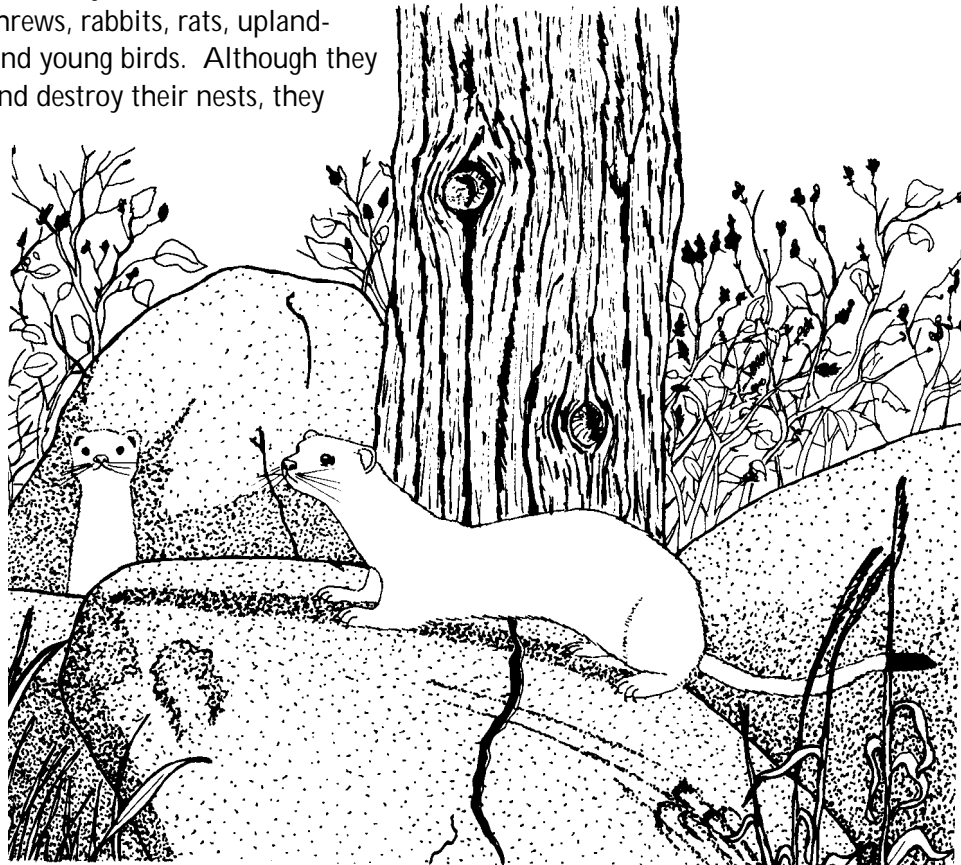


Figure 14

Striped Skunk (*Mephitis mephitis*)

Striped skunks are the best known member of the weasel family, thanks to their distinctive color and odor. Striped skunks are black with a white stripe that runs down the center of the head, then splits into two white stripes at the shoulder. These stripes extend to the base of the primarily black tail (Figure 15). Skunks are relatively small animals with small heads, short legs, stout bodies, and bushy tails. An adult striped skunk may weigh up to 14 pounds and be 28 inches long.

Striped skunk males may mate with more than one female during a February-March breeding season. The gestation period of the striped skunk is from 59 - 77 days. Litters containing 2 - 16 young are produced annually. Young skunks mature quickly and are able to fend for themselves by 4 months of age.

Skunk den sites may include rock piles, building foundations and crawl spaces, hollow logs, hay stacks, and abandoned fox and woodchuck dens. Skunks do not hibernate, however they may sleep for several weeks during the coldest part of the winter. Skunks are generally solitary animals, yet several may use one den during the winter sleep.

Striped skunks are found throughout the United States, extreme northern Mexico, and southern Canada. They are adapted to urban and rural habitats where water is available. Their movements are confined to a home range that may be up to 2 square miles in size. The home ranges of several skunks may overlap.

Striped skunks hunt at night, searching areas near den sites, or traveling along fence rows, ditches, and roadsides. Their diet includes a wide variety of items, such as insects, rodents, reptiles, birds, eggs, fruits, berries, and carrion. High densities of striped skunks can reduce nesting success rates of local upland-nesting birds.

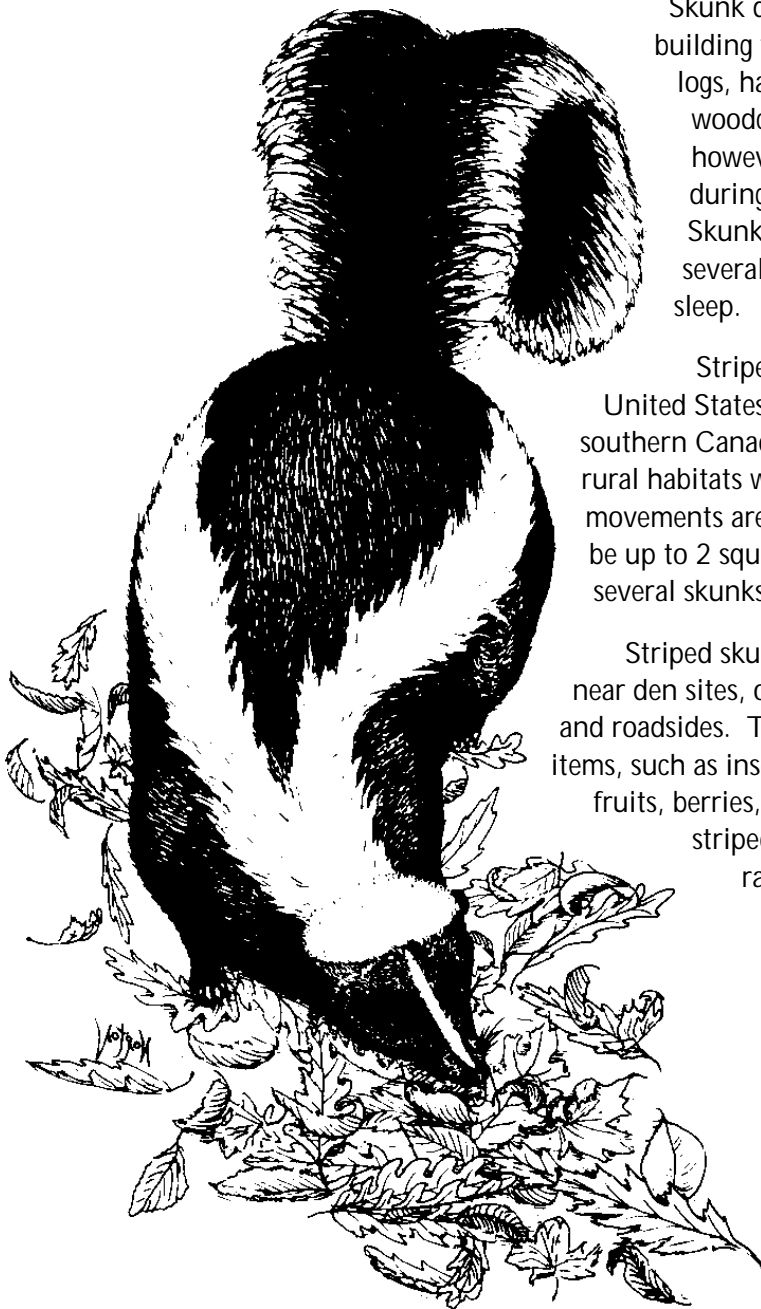


Figure 15

PROCYONID

Raccoon (*Procyon lotor*)

Raccoons are easily recognized by the black fur around the eyes that resembles a bandit's mask (Figure 16). The body fur is a grizzled grey and black, the tail has rings of black fur alternating with grizzled fur. Adult raccoons may weigh up to 30 pounds. The nose and ears are pointed, the legs relatively short, however, the feet are long and slender. Raccoons are well-suited to living in urban and rural areas, and have expanded their range as humans altered the landscape. Raccoons are found in most of Mexico and the 48 contiguous United States, but are absent from northern Canada and Alaska. They are common in urban environments.

Male raccoons may mate with several females during their breeding season which occurs from late January through February. Litters averaging 3 - 5 young are born, following a gestation period of 63 days. The young spend the first few weeks in the safety of the den, usually a hollow log, tree cavity, in or under a vacant building, or in some other suitable site. Young raccoons are weaned between 2 - 4 months of age but stay close to their mother until autumn.

Raccoons do not hibernate, however, they become inactive during periods of extreme cold, at which time they find a suitable burrow and sleep until the weather warms. Adult raccoons have small home ranges and usually do not travel more than one mile from the den site. Young raccoons may travel several miles after leaving their family group.

Raccoons are most active at night. They are seldom seen during the day, but they may change their activity pattern to take advantage of abundant food and water. Raccoons usually search for food along streams and wetlands, but they also frequent uplands and urban areas.

Raccoons are opportunistic feeders and consume many food items. Their diet consists of young birds, eggs, reptiles, fish, crayfish, insects, mice, fruits, nuts, garbage, and carrion. Raccoons, like mink, commonly hunt water habitats not used by other mammalian predators, thus they pose a significant threat to birds nesting over water, on islands, and around wetlands.

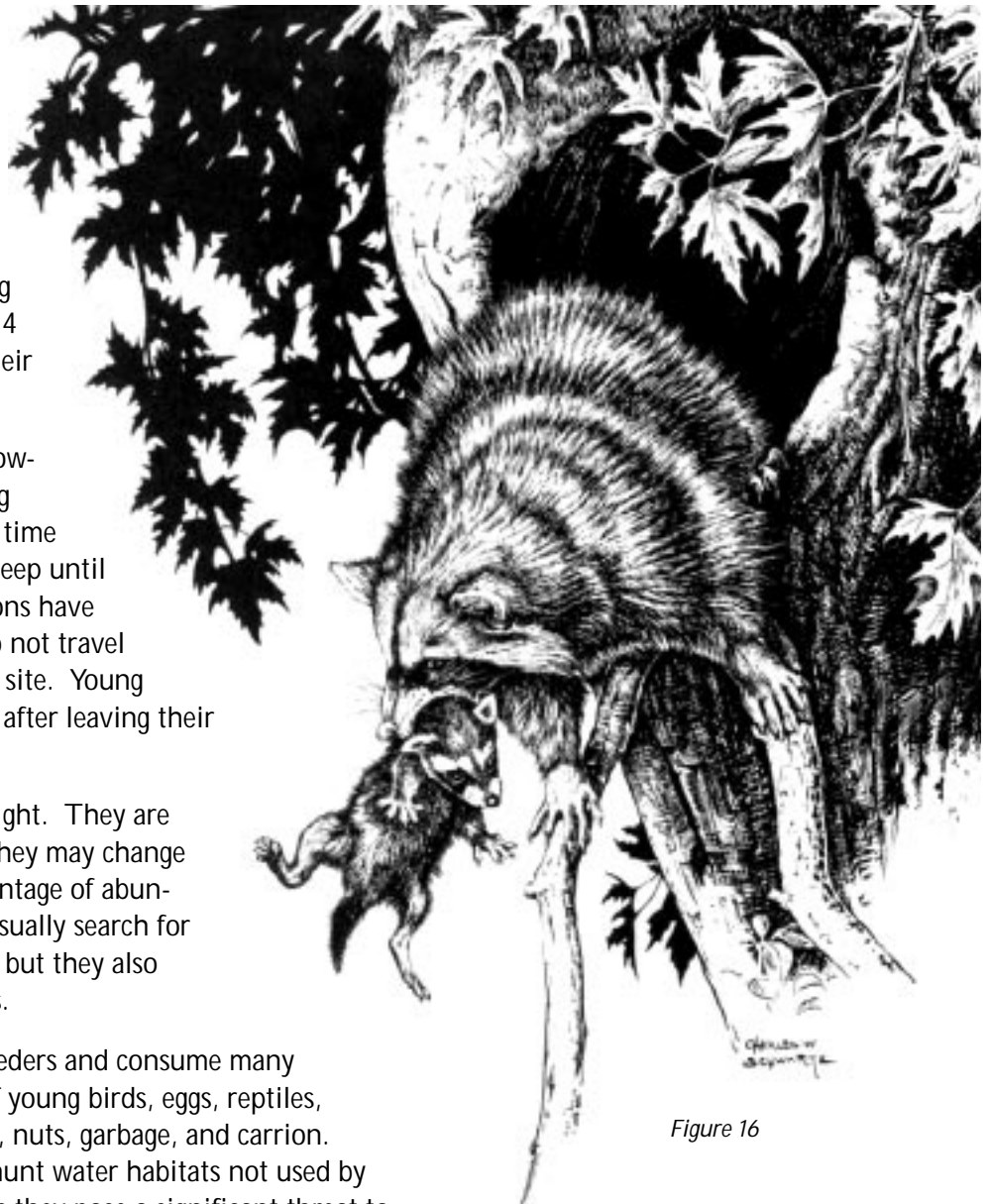


Figure 16

SCIURIDS

Ground Squirrel (*Spermophilus spp.*)

Ground squirrels are burrowing rodents that range in color from light to grayish brown. Adult ground squirrels may be up to 10 inches long with a tail of 5 to 6 inches, and weigh over 1 1/4 pounds. The Franklin's ground squirrel (*S. franklinii*), which is considered to have the greatest impact on upland-nesting bird nests, inhabits the grasslands areas of the central and northern United States into south-central Canada (Figure 17). There are a number of other ground squirrels with similar habits that fill a comparable niche in other areas.

The home range of most ground squirrels is less than an acre. Ground squirrels excavate underground burrow systems or improve a burrow abandoned by another burrowing rodent. These burrow systems reach depths of six feet with many entrances. These entrances, in contrast to those of the pocket gopher, are generally left open. The burrows are used to escape summer heat, winter cold, predators, and to raise young. Breeding occurs as soon as females emerge from hibernation in the spring and young are born after a 4 - 5

week gestation period. A litter consists of 2 - 10 young. Ground squirrels generally produce only one litter per year.

Ground squirrels prefer to eat lush green vegetation but switch to dry vegetation and seeds as availability warrants. Ground squirrel diets also may include bird eggs and young. The diet of Franklin's ground squirrels includes one fourth or more of animal matter, a higher percentage than the diets of other ground squirrels. Ground squirrel predation on upland-nesting bird eggs and their young does not constitute major impact on the productivity of breeding birds under ordinary conditions. However, when predators that typically prey on ground squirrels are reduced or excluded from waterfowl breeding areas, ground squirrel numbers can increase, resulting in major impact on the productivity of an area.

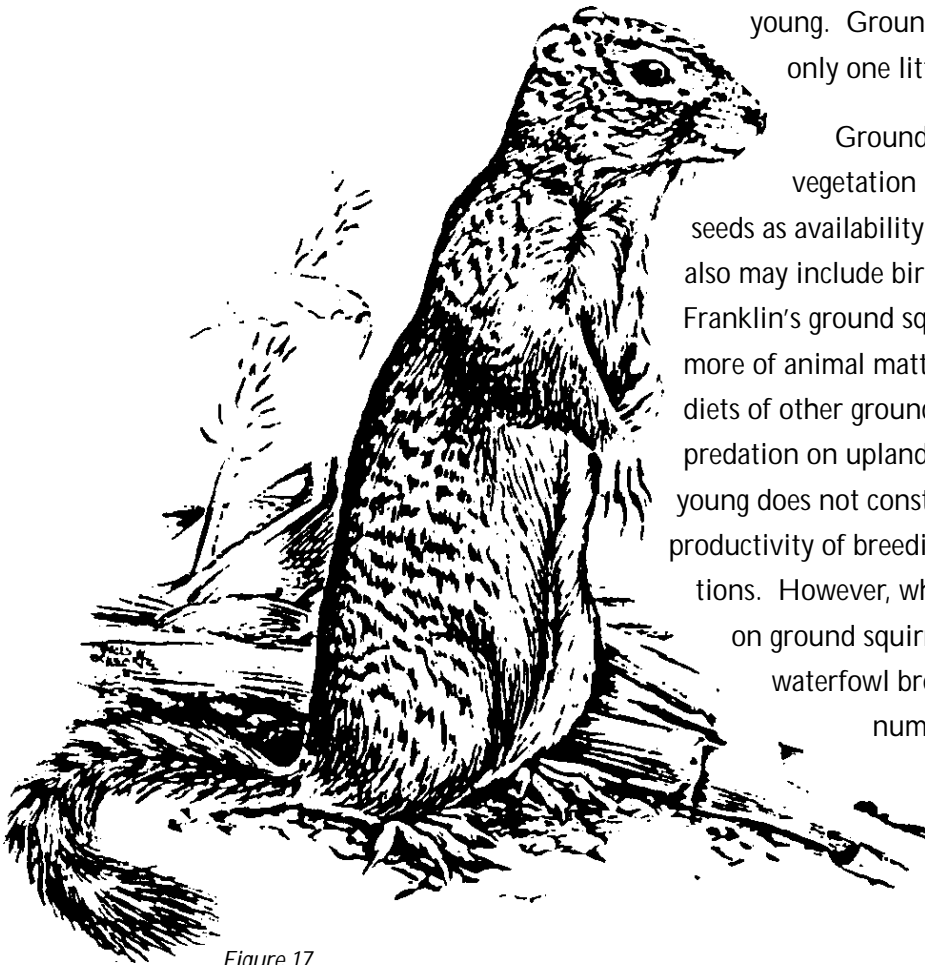


Figure 17

BIOLOGY AND ECOLOGY OF REPTILIAN PREDATORS

REPTILIDS

Because reptiles are cold-blooded (primarily dependent on their environment for heat), they require warm temperatures to function. Thus, the diversity of potential reptilian predators on upland-nesting birds decreases in colder regions. The northern-most North American reptile, the common garter snake (*Thamnophis sirtalis*), is found as far north as the Northwest Territories of Canada. Reptiles adjust their activity patterns to be active in that portion of the day when the temperature of their surroundings is closest to their optimum temperature. Most reptiles are truly terrestrial. They generally do not require environments rich in water to survive. This adaptation to dry conditions makes reptiles ideally suited to arid environments.

Lizards

The skin of a lizard is dry and scaly. Some are strictly vegetarians while others eat small mammals and insects. Lizards range from oviparous to viviparous in their mode of reproduction. Few North American lizards prey on birds, hatchlings, or bird eggs. The Gila monster (*Heloderma suspectum*) and the Mexican beaded lizard (*H. whoredom*) are exceptions. They are two of the largest North American lizards and the only ones that are poisonous. These lizards should be approached with caution. They are found in the desert regions of Mexico and the southwestern United States. The Gila monster can achieve 19 inches in length, the beaded lizard approximately 36 inches. They are colored similarly, a marbled black with pinkish, orange, or yellow blotches. Females generally lay 3 - 5 eggs that they bury 4 - 6 inches deep. These reptiles are most active at night and eat bird eggs, rodents, insects, and other reptiles. They are seldom found in high enough densities to have a significant impact on breeding bird production.

Snakes

Snakes are found throughout North America. All snakes are predators. Some eat only insects while others eat small to medium-sized mammals, other reptiles, birds, and eggs. All prey is eaten whole. Although many North American snakes eat birds, hatchlings, and eggs, they appear to have little impact on healthy bird populations. In local areas, however, high densities of snakes such as the bull snake (*Pituophis melanoleucus*) can cause severe problems.

Turtles

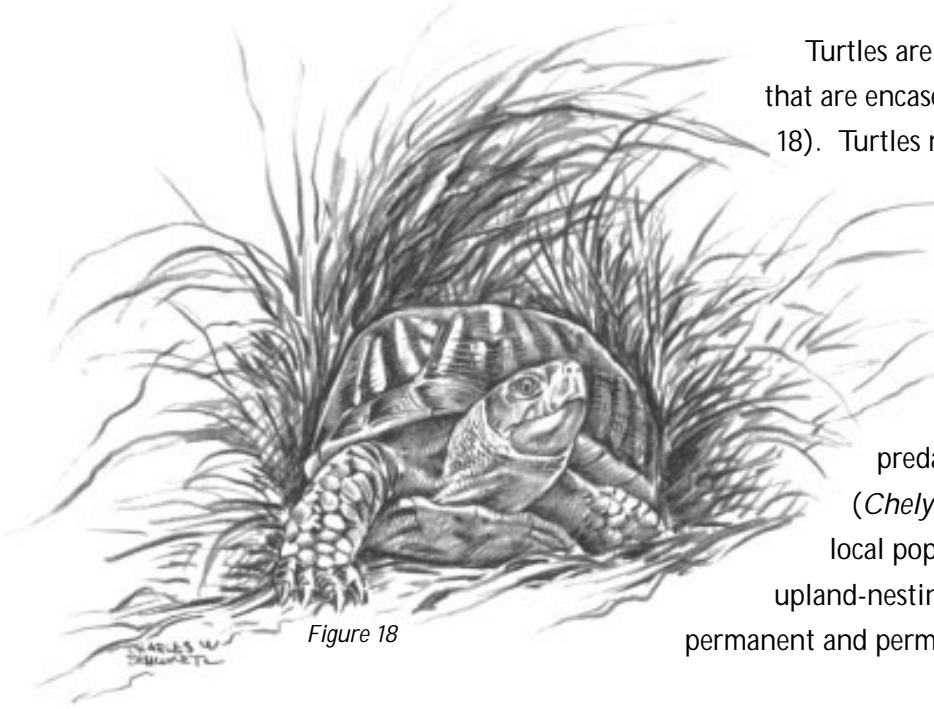


Figure 18

Turtles are reptiles with short, wide bodies that are encased in a protective shell (Figure 18). Turtles may be aquatic to terrestrial, however, all lay their eggs on land. Turtles feed on both plants and animals. Birds and eggs may be included in their diet in addition to insects and carrion. Turtles are efficient predators in water. Snapping turtles (*Chelydra serpentina*) may impact local populations of waterfowl or other upland-nesting water birds inhabiting semi-permanent and permanent wetlands or water areas.

BIOLOGY AND ECOLOGY OF AVIAN PREDATORS

AVES

Although the avian species identified in this section are potential predators of upland-nesting birds; adult birds, their nests, and young are protected by state and federal laws.

Great-Horned Owl (*Bubo virginianus*)

The great-horned owl is the most widely distributed raptor in North America. It is named for the 2 ear tufts on the top of its head that give the appearance of horns (Figure 19). Their backs are mottled with brown and white feathers, the chests are horizontally barred, and a white patch is present on the throat. They are large owls with bulky bodies weighing an average of 3 ½ pounds and wingspans up to 55 inches.

Great-horned owls are among the first birds to nest each year. The pair mates and the female begins incubating a clutch of 2-5 eggs by February or March. This owl never builds a nest of its own, instead it uses the abandoned nests of red-tailed hawks and other raptors. Great-horned owls generally nest in trees or on cliffs. Young are fed by both parents and venture out of the nest after one month. By fall the young have matured.

Great-horned owls are most active after sunset. They prey extensively on small mammals including mice, rats, mink, weasels, woodchucks, skunks, and domestic cats. Additional prey includes frogs, fish, and other birds. Captured prey animals are taken immediately to a perch and eaten. Because great-horned owls are not migratory, they may extract a heavier toll on resident upland-nesting bird by preying on them throughout the year. The added stress of predation during the winter, a time when the upland-nesting birds are most vulnerable and under a great deal of stress from the environment, may magnify the effect of this owl on resident bird populations.



Figure 19

Red-Tailed Hawk (*Buteo jamaicensis*)

Red-tailed hawks are large, soaring birds of prey. They have dark feathers covering the back with lighter colored feathers on the front. They usually have a red tail (Figure 20). The sexes are colored the same, however, the females are larger. Mature females will reach a length of 25 inches and weigh 4 pounds; in contrast, adult males obtain a length of 22 inches and weigh approximately 3 ½ pounds. They have a wingspan up to 4 feet. These hawks inhabit most of North America.

Red-tailed hawks mature at 2 years of age. Breeding red-tails are generally monogamous. They prefer to nest where they have a good view of the surrounding area, usually high in a tree. The pair may construct a new nest or use an old one. Nests are constructed of heavy twigs and may reach 30 inches in diameter when complete. The female lays 2-4 eggs in March and April followed by an incubation period of approximately 34 days. After hatching, the young remain in the nest for approximately 40 days and are tended by the adults.

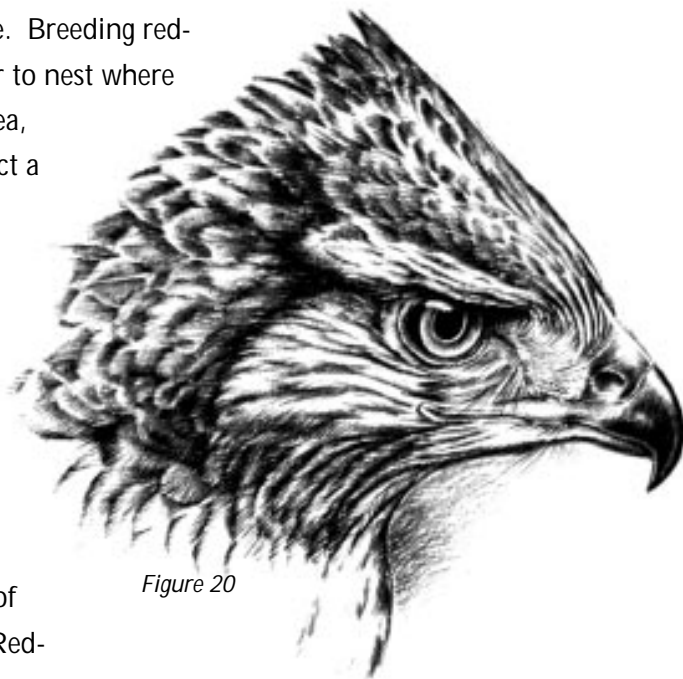


Figure 20

Most of a red-tailed hawk's diet consists of small mammals, birds, snakes, and insects. Red-tailed hawks prey on adult birds and their young. However, because birds are a secondary food source, red-tailed hawk predation is usually not considered detrimental to bird populations when habitat conditions are adequate.

American Crow (*Corvus brachyrhynchus*)

American crows are coal-black birds that average 19 inches in length (Figure 21). American crows have long wings, strong legs, and thick, curved bills. They fly with regular wing beats and can reach speeds of 32 miles per hour. They have benefitted from European settlement of North America due to the planting agricultural crops and trees in formerly treeless prairie.

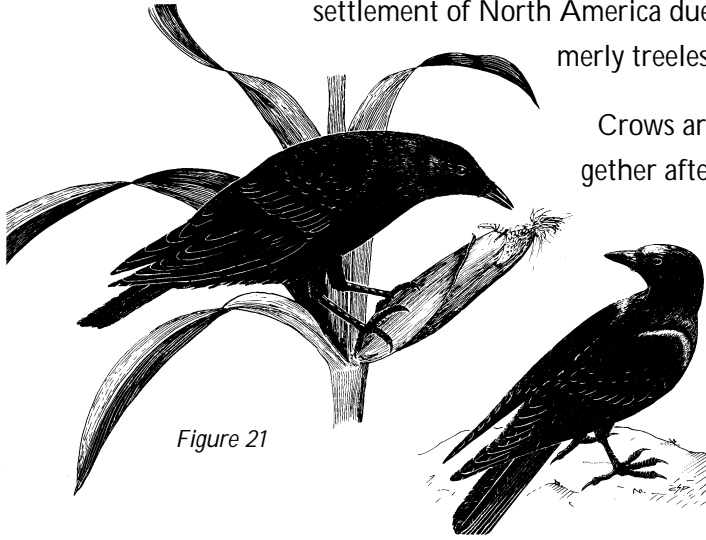


Figure 21

Crows are primarily monogamous with pairs remaining together after mating. Courtship begins in April and May. Crows build nests high up in the forks of trees, on cliffs, and in other elevated structures. Females lay 4-5 eggs and incubate them for 17 - 20 days. The young stay in the nest for 30 - 35 days after hatching.

Crows are generalists and change their diet as food availability changes. They consume a variety of animal matter including eggs and young birds, small mammals, insects, frogs, and carrion. A large portion of their diet may include agriculture crops, such as corn and other small grains. Large concentrations of crows can severely limit the productivity of local populations of upland-nesting birds, primarily by preying on eggs. These effects are generally greatest early in the season when nesting cover is reduced.

Common Raven (*Corvus corax*)

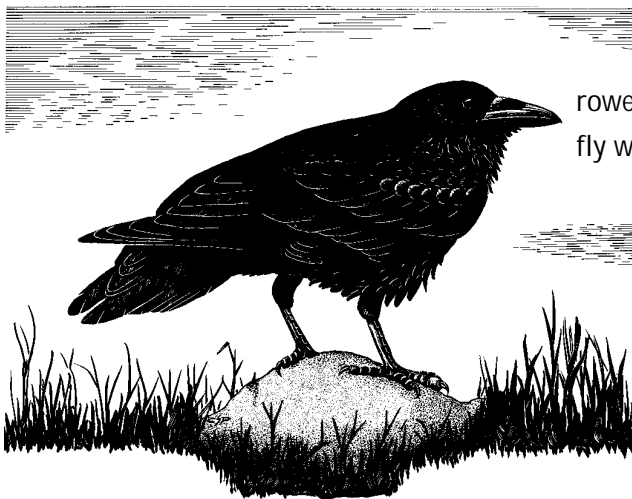


Figure 22

Common ravens are larger than the American crow (approximately 21 inches long), but are virtually identical in appearance (Figure 22). The ravens have narrower wings and more massive black bills. Like the crow, they fly with regular wing beats but slower than the crow.

Ravens are generally monogamous. The nest may be a new construction or an old nest may be modified. Nests that are used in consecutive years can be 6 feet high. These solitary birds prefer to nest near the tops of tall trees or on cliff edges. Adult females lay 4 - 6 eggs which are incubated for 20 days. Ravens do not reach sexual maturity until their third year.

Ravens feed on carcasses, small mammals, insects, bird eggs, and agricultural crops. Large groups of adults and nonbreeding juveniles can impact nest success rates for upland-nesting birds.

Magpies (*Pica spp*)

Magpies are a midsized, noisy, bird with short wings, a long wedge-shaped tail, heavy bill, large head, and white wing patches all on a colorful body (Figure 23). The tail and wings are iridescent, reflecting bronzy-green to purple. Black-billed magpies

(*P. pica*) have black bills and are slightly larger than yellow-billed magpies (*P. nuttalli*). However, body color is the same for both species. Black-billed magpies obtain a total length of approximately 19 inches, of which half is tail, and generally weigh more than ½ pound. Yellow-billed magpies obtain total lengths of approximately 17 inches and weigh less than ½ pound. Black-billed magpies have an extensive range in western North America, while the yellow-billed magpies are found only in central California.

Magpies are generally monogamous with pairs staying together for a year. Magpies primarily nest in grassland environments that contain thick brush, trees, and thickets, or on the boundaries of woodlands.

Ravens have also nested under the eaves of buildings, on telephone poles, and on houses.

In April or May, the female lays a clutch of 5 - 7 eggs. Young are hatched after a 18 day incubation period. The young remain in the nest for 22 - 27 days and the juveniles rely on the parents for food for 6 - 8 weeks. The adults and young remain together until autumn or early winter.

Magpies prey on young birds and eggs. In the local areas where nesting cover is limited, magpies can be a major predator on upland-nesting birds. These conditions typically occur early in the nesting season.

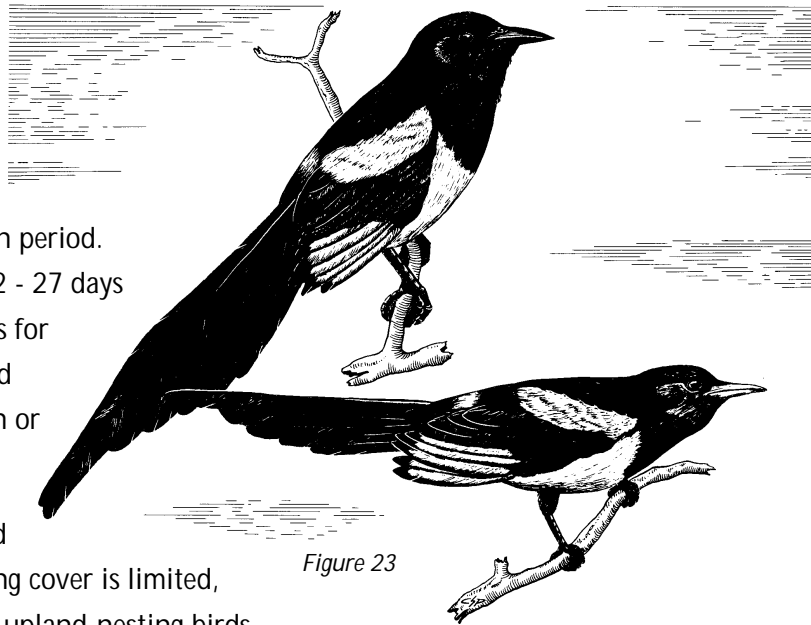


Figure 23

SUMMARY

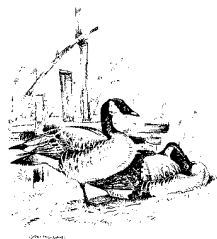
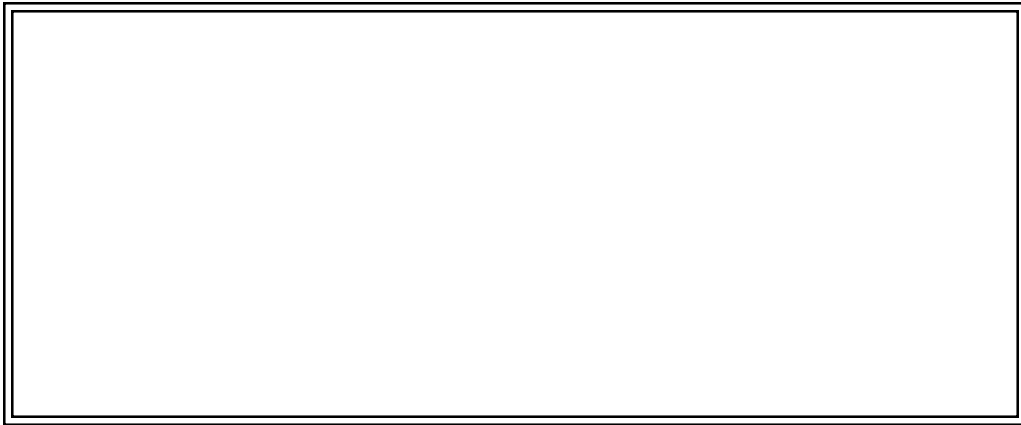
Predation has been identified as a key factor limiting upland-nesting bird reproductive success in many studies. These results suggest that the effects of predation could be reduced by establishing and maintaining suitable nesting habitats. In several studies, habitat management alone was able to maintain populations of upland-nesting birds at or slightly above threshold believed necessary to sustain populations. However, additional studies also have shown that avian populations increased substantially after predator populations were reduced or nesting birds were protected by restricting predator access through the use of electric fencing or creating nesting islands. These practices, however, need to be implemented in combination with good habitat management if optimum benefits are to be realized (Figure 24).



Figure 24

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