TURKEY, QUAIL, AND PREDATORS IN THE ROLLING PLAINS, TEXAS

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***Abstract**:* Predators like coyote (*Canis latrans*), bobcat (*Felis rufus*), skunks (*Mephitis* spp.), and raccoons (*Procyon lotor*) do kill substantial numbers of turkey (*Meleagris gallopavo*) and quail (*Colinus virginianus*). This leads one to ask whether there are fewer birds to harvest because of this predation and whether predator control could increase harvestable stocks. Predator control can be effective on a site-specific basis but may be impractical at larger scales. Traditional habitat management may also be ineffective where birds are forced to concentrate in remaining patches of fragmented habitats. Predator control, like many resource management issues, must be decided in a value-laden public arena, not solely on the basis of still insufficient scientific data. I argue that we need to separate these issues to understand the basis on which decisions are made and to determine what information we still need to know.

Fates of 300 radio-transmittered turkeys (*Meleagris gallopavo intermedia*) monitored on 4 study sites across the northern rolling plains (Matador WMA to Kansas) during 2000 showed that 52% (n = 155) of the transmittered birds died. Of these, 85% (n = 132) were depredated with losses attributed primarily to coyote (*Canis latrans*; 46.5%, n = 72) and bobcat (*Felis rufus*; 12.9%, n = 20) with some losses to raccoon (*Procyon lotor*; n = 1), great horned owl (*Bubo virginianus*; n = 4), and 14.8% (n = 33) to predation with insufficient evidence to determine which predator species was responsible. A first thought might be that with a 50% loss to predators and most of it attributable to coyotes, then we better control coyotes. Or do we need to improve habitat so turkeys can escape from predators? But, the question is not nearly so simple as that. What are the population consequences of these losses? Is this unusual or do turkey populations usually experience such mortality rates? When and where are turkeys being killed? Are there specific age and sex classes of turkey that are most susceptible? Is this 50% loss during a particular season or the result of particular environmental conditions that could be remedied? Are turkeys taken randomly or are there specific causes for the losses that we saw? What kind of predator control might work? What will happen if I just start removing coyotes? What habitat changes might be effective?

This turkey population may not be in any danger, just because many turkeys are dying. Predation rates reported for turkeys range from 4-31% (Vangilder 1992). But, perhaps I could have more turkeys if fewer were depredated. How close is the population to carrying capacity (K)? If near "K" we would expect mortalities to be compensatory and any reduction in losses to coyotes would likely result in increased mortality due to other factors, though one of these could be hunting. If predation is keeping turkey populations below carrying capacity, then predator control might

provide a window for the population to grow to the point that it might escape limitation by predation.

Despite winter ice storms this past winter, mortality was heaviest on juveniles, for adults it was toms in spring or hens during the nesting season. Predator control at localized winter roosts would be ineffective, as it would not address the predator population causing the losses. However, turkeys disperse quite some distance during breeding, courtship and nesting. I would have to do extensive coyote control to effectively cover the areas where these predation losses are occurring. What would happen if I tried to control coyotes this way?

PREDATOR POPULATION RESPONSES

Predator abundance is greatest where the greatest available resources per individual predator persist. Reducing coyotes results in more resources per remaining coyote with higher survival and reproduction rates for those that remain (Knowlton 1972, Connelly and Longhurst 1975). Abundant prey and removal of territorial animals also will attract new individuals from surrounding uncontrolled areas. Densities of mid-sized carnivore can increase where coyote populations are reduced or excluded. Raccoons and skunks were significant nest predators and increased on Welder Wildlife Refuge where coyotes were excluded due to decreased predation on skunks and raccoons by coyotes or increased prey base available to them (Baker 1978). Current work at Texas Tech indicates that swift fox (*Vulpes velox*) respond similarly to coyote removal in the High Plains (J. Kamler and W. Ballard. pers. commun. Department of Range Wildlife and Fisheries Management, Texas Tech University, Lubbock, TX 79409). Evidence from the prairie potholes indicates that where nesting waterfowl are concentrated in isolated habitat patches predators can have significant effects on population survival and density (Sargeant et al. 1984). Intensive predator control in small areas (< 300 km^2) increased duck nesting success (Duebbert and Lokemoen 1980). Kie et al. (1979) increased a deer population in south Texas by removal and exclusion of coyotes in a 361-ha enclosure.

But when and where should predator control be used? Predator control may be a legitimate tool in fragmented habitats (Guthery 1995) or where predators find concentrated prey species (Sargeant et al. 1984). However, predator control programs only have been successful when removals were for specific small areas. Predator control over vast portions of west and south Texas is meaningless (Guthery 1995). Do we have the resources to remove enough (>70%) of the target predator population (Connelly and Longhurst 1975)? New individuals will be produced or re-colonize to take advantage of the available prey, often faster than they can be removed. The ability of predator populations to increase productivity in response to reductions and the potential meso-carnivore release that can accompany removal of top predators may offset any expected prey species gains. Even if we could reduce coyote density enough, how long would we have to continue the reductions? During nesting season, every year, for >50 years? In addition, while we might reduce game bird losses to coyotes we could see a concomitant increase in losses to bobcats or nest depredation due to skunks, raccoons

etc., trading one form of predation for another.

HABITAT QUALITY AND EDGE

So perhaps a more long-term solution is needed. A 'truism' with which many of us grew up, "Habitat is the key…. if the habitat is in good shape, predation won't be a problem," suggests that we just need to create or conserve better habitat. So what might constitute better habitat? What makes one habitat better than another? Landowners and managers throughout Texas seem to believe that providing food will increase desired wildlife species. Reviewing the effects of feeders to increase northern bobwhite quail (*Colinus virginianus*) abundance Guthery (1997) found only 8 replicated studies and these indicated that autumn quail density was similar between unfed and intensively fed (≤25 ha/feeder; fed ≥6 mos./yr) sites. This suggests that feeders had no positive effects on quail population. However, population density is the net result of all population parameters. Increased mortality from concentrating predators at feeders could offset expected density gains from feeding. Turkey populations in the northern Rolling Plains exist in isolated patches along riparian corridors where roost trees persist. In our studies >80% of wintering turkeys are associated with roosts near some sort of artificial feed source. Turkey predators (particularly coyote and bobcat) regularly take birds associated with these feeding areas. Is this predation the reason that turkeys are not increasing?

Turkeys, like quail, are an 'edge' species, a species of low mobility requiring ≥2 habitat types, which, according to Leopold's (1933:132) Law of Dispersion, should show densities proportional to the sum of edge in an area. However, quail density is not directly correlated to amount of edge (Guthery and Bingham 1982). Guthery (1997) argues for increasing useable space, rather than trying to increase habitat quality. However, there is a 'threshold' when creating edge. Interspersion of habitats or edge within large habitat patches increased the space that quail could use. But, once quail can reach all the habitats they need there is no concomitant increase of useable space as more edge is created. More and smaller patches do not increase space useable for quail, instead they increase habitat fragmentation. Fragmentation leads to undesirable edge effects such as decreased survival of nesting females and increased nest predation. There is ample evidence of increased predation near edges (Anglestam 1986, Johnson and Temple 1990). Paton (1994) reviewed 18 studies of edge effects and found a consistent positive relationship between nest success and patch size. He also generalized that nest predation rates were greatest < 50 m from the edge and this pattern could occur in forested or grassland habitats.

Guthery's (1997) 'space-time specific density' is simply density in relation to resources available for quail at a specific point and time. Density-dependence is the number of animals in relation to the amount of resources available for those animals and not the number of animals per unit area (crude density). This is a key and often misleading point consistently missed in arguments over density-dependence in wildlife species. What is crucial is the amount of resources per individual, which varies directly with area only where resources are uniformly

distributed. Predators can affect resources available per individual by making the risk associated with using some resources so high that they become unavailable to the prey populations. Population responses are the result of the sum of individual animals assessment of the risks and the consequences of their choices. Have we fragmented habitats and increased prey for mid-size carnivores, concentrating them at feeders, such that there are few places, even for dispersed nesters, that have low enough risks of predation?

PREDATOR CONTROL AND PUBLIC PERCEPTION

We have perpetuated a misconception that has not yet been adequately explained to the American public. "There is a growing tendency on the part of scientists to defend the predator as indispensable to the welfare of the animal preyed upon." (McLean 1930 in Leopold 1933). While predation is an important evolutionary force and predators are part of complete ecosystems, the effects of predators may at times be at odds with population management objectives. Perhaps biologists themselves also suffer from Leopold's description of the management sequence (Leopold 1933:4) implying that predator control, as an early management tool, has no place as we reach more evolved stages of management.

Traditional direct management approaches (e.g., stocking, predator control) are becoming more controversial with changes in wildlife stakeholders. The increasingly urban American public generally appreciates predators, believes in their right to exist, and shows little interest in personal consumptive use of wildlife (Messmer et al. 1999). They want predators preserved and reintroduced where they have been extirpated. Predators have become viewed as symbols both of wilderness and of healthy ecosystems (Messmer et al. 1999).

However, the public still supported control of mid-sized predators to enhance avian recruitment, except for controlling raptors to protect upland game birds (Messmer et al. 1999). Support was greater when prey species was threatened and when predator species were less charismatic. There was more support for 'surgically' applied control in emergency situations than for widespread predator control (Messmer et al. 1999).

Application of any kind of predator control today requires both good scientific rationale and public support. Publics base their opinions on a variety of value-laden information sources and personal agendas. Landowners and the general public have difficulty telling what is real information. When we, as scientists, present conflicting points of view and do not explain our positions well, public support will tend towards emotional issues. Wildlife management, though best based upon credible science, is still management – still the art of using science to meet human objectives and desires. We should admit when predator control is a euphemism for bureaucratic program growth or for recreational 'varmint' trapping and hunting and then be willing to deal directly with those public relations consequences. Similarly, we must provide the evidence necessary to show that specific control actions will be effective tools to meet the population objectives for game bird species and let decisions be made based on public

values for predators and prey.

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