# QUAIL NEWS

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The newsletter of game bird research and management from the Bollenbach Chair, Oklahoma State University.

## PREDATORS

No topic raises stronger passions in quail management than predation and its effect on bobwhites and other quail. This special edition of *Quail News* explores predator issues from several perspectives. Lest you expect a whitewash, take note: there is no doubt that predator suppression can increase the survival and production of deer, antelope, waterfowl, wild turkeys, and game birds. There is no guarantee, however, that predator suppression *will* increase their survival and production. Quail are, for reasons we'll explore, especially irresolute in their response to predator suppression.

Predator control has deep roots as a wildlife management practice. "For at least 2,000 years, humans in Europe have been hostile towards competing predator species," report J. C. Reynolds and S. C. Tapper, the Game Conservancy Trust. The concept of competing species as injurious to human interest seems to have arisen when humankind first domesticated crops and animals.

"[W]hen European colonizers reached North America in the sixteenth century, they took with them the cultural attitudes of the time towards predators," report Reynolds and

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Tapper. "The practice of predator control specifically to benefit small game species emerged relatively late in Britain with the development of the large, privately owned sporting estates in the early nineteenth century."

What have we learned in the 2,000-year standoff between mankind and carnivores?

## THE OLD-TIMERS SPEAK

The foundation for game management in the United States was laid by a gifted group of biologists who worked primarily during the 1920s through the 1940s. Whether right or wrong, their opinions about predator control in game management have influenced 2 generations of conservationists. Herewith, a sampling of their outlooks on the predator-quail issue.

"Hence it can not be too strongly emphasized that the control of quail enemies is a regular and necessary part of preserve management, if such tracts are to be worthy of the name and produce quail in real abundance."--Herbert L. Stoddard, 1931.

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"All of the visible evidence pointed to the conclusion that harassment of foodless coveys [by hawks] led to their subsequent starvation, or decimation by hawks of some kind, whereas harassment of fed coveys did no visible harm. It was not determined what species of hawks were responsible for the frequent evidences of 'murder' which were found, but this question is irrelevant to the present contention that there is an intimate relationship between harassment, cover, food, and winter survival, and that one of the most effective forms of 'predator control' is plenty of escape cover and food."--Aldo Leopold, 1933.

"On but two experimental areas were concerted attempts known to have been made to reduce the resident predator populations, and in neither case could any resulting benefit to quail be recognized."--Paul L. Errington and F. N. Hamerstrom, Jr., 1936.

"Elimination of 524 furbearers [on 3,000 acres] over a 13-months period had no measurable effect on reproductive success of quail on the area. Trapping was stopped when it became plain that outside population pressure would restock the area indefinitely."--Alfred S. Jackson, 1950.

"What happened on Groton Plantation [in South Carolina] is another example of population increase without predator control. Coveys increased from three hundred to over six hundred in three years as a result of the owner's improving the environment for bobwhites, and without killing, removing, or making any effort to

control predators."--Walter Rosene, 1969.

"To those many King Ranch visitors who asked what was primarily responsible for the almost unbelievable upsurge of game on the King Ranch in the late 1940s, I gave what I believed to be the correct answer: effective coyote control in habitats that were initially underpopulated."--Val W. Lehmann, 1984.

## TWO TEXAS STUDIES

Sam Beasom, like Val W. Lehmann, conducted predator control research on the King Ranch. He also directed another study that took place in a different part of South Texas.

Beasom removed 188 coyotes, 120 bobcats, 65 raccoons, 46 striped skunks, and 38 other mammal predators from 9 square miles over a 2-year period. Bobwhites on the area with predator control produced, on average, 3.4 chicks/hen. Bobwhites on a like area without predator control produced 2.3 chicks/hen.

In the second South Texas study, technicians took out 132 coyotes, 18 bobcats, 15 raccoons, 22 striped skunks, and 40 other mammal predators from 6 square miles over 2 years. "The data indicate," they reported, "intensive predator control had but slight influence on quail populations [bobwhites and blues]. If there was any effect, it was that the treatment enabled populations on poorer habitat to maintain roughly equivalent numbers with those on better habitat."

Beasom kept careful records of expenses for the predator control treatments on the King Ranch. The control cost was $1,171/square mile in 1997 dollars. Each bobwhite produced from predator control cost an estimated $26. This would translate to about $131 per bird in the bag, because not all birds produced would be harvested. Actually, these costs would be offset to some degree by the commercial value of wild turkeys and white-tailed deer produced by Beasom's experimental predator control.

The *annual* cost of applying a predator control program like that of Beasom over the entire King Ranch is estimated at $1,400,000, over all of South Texas at $36,500,000, and over all of Texas and Oklahoma at $394,900,000.

## WHY PREDATOR CONTROL MAY FAIL

The opinions and experience of old-timers and the results of research show predator control is not guaranteed to increase the abundance of bobwhites and other quail. Why? Because natural processes reduce the effectiveness of predator suppression:

- Death from old age and accidents. No matter how effective a predator control program, somewhere between 20 and 40% of quail will die each year from old age and accidents. These deaths will take place whether predators are present or absent.

- Renesting. A bobwhite hen will, in average years, go through 3-4 nest efforts in an attempt to raise at least 1 brood. So, even if the chance of success is low on a particular attempt, it will be high given multiple attempts. For example, if a hen has a 40% chance of success on any attempt, she will have a 78% chance of success with 3 attempts. Birds that are less likely to renest, like ducks and wild turkeys, do not have this built-in cushion against nest loss.

- Multiple-brooding. This occurs when 1 hen is responsible for the laying and hatching of more than 1 nest. There is some evidence that hens are more likely to attempt multiple-brooding if the first nest is destroyed or otherwise lost.

- Competing risks. When 1 quail or 1 nest is saved from a predator, the quail or nest becomes more vulnerable to other sources of loss. For example, if all nest-destroying predators were taken out of an area, more nests would be lost to trampling, flooding, heat-addling, abandonment, and other causes. Competing risks can be understood in human terms if you consider modes of conveyance—cars, motor cycles, bicycles, trains, and planes—as predators on humans. You can reduce your risk to carnivorous cars by riding bicycles more, but this increases your risk to carnivorous bicycles. The net effect of competing risks is that 1 nest saved from a predator means less than 1 nest saved for production.

- Time benefits of predation. While it is true that maximum quail production occurs when all sources of loss are eliminated, it is *not necessarily* true that maximum populations at the start of hunting season accrue from 100% nesting success. Nest destruction by predators and other agents shifts the average hatch to a later date in summer. The later a nest hatches, the more likely the chicks are to survive until the start of hunting season. For example, 100 chicks hatched on 1 June yield an expected 39 chicks on 1 November, 100 chicks hatched on 15 August an expected 62 chicks. As nest destruction moves hatching to later dates through renesting, more quail appear at the start of hunting season.

- Increased productivity of predators. Coyotes in sheep-producing areas respond to control by breeding at an earlier age and by producing larger litters. As a result, fairly intense suppression may have little net effect on year-to-year populations. However, the suppression may reduce sheep losses by reducing the total exposure of sheep to coyotes.

- Release of other nest predators. To the extent that predators reduce the exposure of game bird nests to certain small mammals, they likely benefit quail production. Not only do small mammals compete with quail for food, but they also may depredate nests. Ground squirrels, cotton rats, fox squirrels, and brown rats are known nest predators.

## MODERN PROBLEMS

Two key issues, habitat loss and what is called "mesopredator release," affect the interpretation of quail populations as we approach the millennium. These modern problems were not present in the 1800s and earlier.

Usually the phrase *habitat loss* is associated with the phrase *habitat fragmentation*. When permanent cover for quail disappears, leaving islands of suitable cover, the habitat is said to be *fragmented*. Quail occupy patches of permanent cover and populations lose the ability to disperse among patches. Low populations on small parcels of habitat cannot persist over the long term; these are called *zombie populations* because they represent the living dead. Likewise, suitable but small patches of cover may not have quail present. These patches, formerly occupied by zombie populations, are called *graveyard habitat*.

The loss and associated fragmentation of permanent cover may intensify the interactions between game birds and predators. Certain predators may increase in abundance because fragmentation creates ideal habitat for them. Also, islands of permanent cover force game birds and predators to occupy the same small parcels of permanent cover, leading to increased losses to predators.



The second modern problem, mesopredator release, remains somewhat speculative at this time. The idea is that large predators (coyotes, wolves, mountain lions) exhibited some population control over mid-sized or mesopredators (skunks, raccoons, foxes). Since the large predators have been extirpated from most of America, the mid-sized predators have increased, according to the conjecture. Limited attempts to scientifically verify mesopredator release have led to ambiguous results. However, there is evidence that duck production is higher where coyotes are *not* controlled than where they are controlled, presumably because coyotes suppress foxes, skunks, raccoons, and other smaller predators.

## PARTRIDGE IN THE UNITED KINGDOM

The success of predator suppression in increasing the production and harvest of grey partridges in England is well known among game bird enthusiasts. The particulars of the program are less well known.

The studies in England are summarized in *The Partridge* by Dr. G. R. Potts, director of research at the Game Conservancy.

The main predators on partridge eggs were carrion crows and rats, not foxes, weasels, and badgers. However, foxes were most likely to destroy incubating hens. Grey partridge hens hold tight to the nest during the later stages of incubation. In fact, they will allow humans to pick them up.

"Despite a thorough search of the vast literature on partridges I can find no *evidence* that raptor [hawk] predation

reduces the numbers of partridges available for shooting, and much evidence that it does not," Potts reported.

Pott's results also showed that nest predation declines as the quality of nesting cover increases.

## WHAT'S NORMAL?

### What is the normal rate of nest success for a population of bobwhites?

John L. Roseberry and W. D. Klimstra studied the nesting of bobwhites in southern Illinois during 1952-1966. About one-third of all nests found (793) hatched; in any year nest success ranged between 25 and 53%.

"Normal" is about 33% nest success, meaning 33 of every 100 nests started eventually hatch. Bobwhite populations will maintain themselves and provide ample recreation for hunters at normal rates of nest success. Don't forget that a 33% chance of success on any nesting attempt leads to a 70% chance that a hen will raise a brood because of renesting.

## PREDATORS VERSUS WEATHER AND HABITAT

### An important job of scientists who analyze the behavior of wildlife populations is to explain what causes variation in abundance from 1 time to another and from 1 place to the next. The more variation that some factor explains, the more important the factor in the ups and downs of quail populations.

A variety of factors other than predators influences the trends in quail populations. Weather and habitat are particularly important.

For quail in subtropical, semiarid environments, the pattern (timing) and amount of rainfall may explain from 70 to 80% of the variation in quail production. Quail here include bobwhites, blues, Gambel's, and California quail. There is not much variation left for predators to explain in these environments. The proper conclusion is that predation on nests and adults contributes relatively little to year-to-year trends in abundance.

John L. Roseberry and Scott D. Sudkamp, Cooperative Wildlife Research Unit, Southern Illinois University, recently analyzed the variability of bobwhite populations from place to place.

First of all, they found that about 76% of the land area in Illinois was not suitable for bobwhites. In other words, bobwhites would not occur on this 76%, even if all predators were eliminated.

Second, they found properties of the landscape—amounts of woody cover, types of crops, amounts of permanent grassland—explained from 63 to 74% of the variation in bobwhite abundance. If one adds variation explained by weather to the landscape findings, we again see that predators probably have a minor role in quail trends.

The key finding of Roseberry and Sudkamp is that the availability of

suitable habitat largely governs quail abundance.

Their findings hold for other areas. Analysis of bobwhites trends in the Red Rolling Plains of western Oklahoma show that populations have been holding their own or increasing slowly for the last 20-30 years. These trends have prevailed despite known increases in the abundance of certain hawks since DDT was banned, and despite the collapse of the fur market. This collapse is hypothesized by some to be associated with increases in the abundance of medium-sized predators.

Likewise, populations of bobwhites and blue quail in the Rio Grande Plains of Texas have shown no long-term trend since DDT was banned and the fur market collapsed. Populations vary from year to year, largely because of the weather, but no long-term trend, either down or up, is apparent.

## THE QUAIL DECLINE

The current quail decline started about 1880 for bobwhites and California quail. The decline has persisted through years with and without DDT, through boom and bust fur markets, and through small- and large-scale agriculture.

The decline has persisted through restrictions in bag limits and seasons, through state-supported predator suppression campaigns, through establishment of game refuges, and through artificial rearing and release of game birds.

Yet the decline has not occurred everywhere in America. We have already noted exceptions in southern Texas and western Oklahoma.

"[T]he vast area [500,000 acres] of private lands managed for bobwhites in the Red Hills region of southern Georgia and northern Florida continues to produce abundant quail populations at the same time bobwhite numbers continue to decline elsewhere in the southeastern coastal plain," reports Leonard A. Brennan, Director of Research at the Tall Timbers Research Station, Tallahassee, Florida.

Is there a common denominator among areas and regions where bobwhites have remained abundant? Yes. Large areas of suitable habitat, made suitable by active management and land use practices compatible with quail.

Nevertheless, predator control will remain topical into the foreseeable future. Perhaps all concerned would do well to embrace the thinking of Paul L. Errington and F. N. Hamerstrom, Jr.:

"Let it be made clear that predator control is nothing that lends itself to rule-of-thumb formulae. It may be desirable, inconsequential, or highly undesirable—all according to the circumstances and the species subject to control."

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