

USABLE SPACE: THE FUNDAMENT OF BOBWHITE HABITAT MANAGEMENT

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Abstract: In the 1990s I screened all the northern bobwhite (*Colinus virginianus*) management literature I could find for successful practices. Successful practices result in higher numbers of bobwhites at the start of hunting season than on areas not managed. The only practices that were consistently successful created suitable, permanent cover-situations (usable space) where none existed before. Usable space can be identified under rules for canopy coverage of brush (30–60%), distance from open sites to brush (less than 30 yards), and distance from interior brush to open sites (less than 30 yards). Under these rules, there are many, many examples of usable space that may differ markedly in appearance but that support similar densities of bobwhites. On areas with habitat that fits these rules, further management might be fuss and fandangle that is pleasing to man, but to which bobwhites are indifferent.

In the early 1990s I gathered all the literature I could find on the response of bobwhite populations to habitat management. The literature I was after consisted of formal field experiments with experimental controls. A control is an area where no management takes place but is similar to a managed area in other respects. Lacking a control, one has no way of estimating the effects of a management practice.

By the mid 1990s, I had collected a stack of literature sufficiently deep to start screening it for management gems. I was, perchance, reading Albert Einstein's *Relativity: a Clear Explanation that Anyone Can Understand* at about the same time. The book was not a clear explanation and I still do not understand relativity. However, the read gave me a notion that fit with the concept that was going to emerge from screening the bobwhite management literature.

I defined a management practice as successful if it resulted in a higher density of bobwhites at the start of hunting season than prevailed on the experimental control. I further required that a practice be consistently successful. Some practices seem to fail at times, succeed at times, and have no effect at times. Artificial feeding to increase winter survival is an example.

Here I review the published results of bobwhite management practices, which led me to formulate the concept of usable space as the fundamental idea of habitat management. I discuss the nature of usable space and enumerate practices that contribute usable space on managed areas.

The only management practices that consistently resulted in more bobwhites on an area were those that created more space for them to live in. In other words, as a class,

successful management practices were those that added suitable, permanent cover-situations (usable space) where none had existed previously.

A “suitable, permanent cover-situation” might imply a good deal of management activity, depending on the climate of a region. In areas with higher rainfall and longer growing seasons, which experience rolling thunder plant succession, maintaining a permanent cover-situation might require burning on a 3-year rotation. Where plant populations toddle along, more or less permanent cover-situations may hold steady for decades. This latter circumstance prevails in much of western Oklahoma and north Texas.

The word “permanent” invokes the notion of time and this brings us back to Albert Einstein. The idea in quail habitat management is to maximize usable space in time or, more simply, to maximize space-time. (The physicists have their own version space-time.) For example, if you manage 20,000 acres, you would be maximizing space-time if you accumulated 7,300,000 acre-days of space-time in a year (20,000 acres × 365 days). Val Lehmann (1984) said it well: “To supply most of the needs of high populations of quail, they must be assured *continuous* use of virtually every square foot of ground” (my emphasis). That’s the point. You maximize space-time when every square foot is usable by bobwhites every day of the year.

The idea behind maximizing space-time is so simple that we only recently “saw the forest for the trees.” If you have 1,000 acres and half of it supports quail, it is obvious that you can double your quail population by fixing the half that *does not* support quail. That is, you would create suitable, permanent cover-situations on the half that doesn’t support quail.

Of course, you could try to increase abundance on the half that already supports quail. You could manage for greater plant diversity, more edge, more food, and so on. I believe you will see little or no return on your management dollar in this setting. Plants are already suitably diverse, edge is already sufficient, and food supplies already are adequate. If conditions weren’t already acceptable, there would have been no quail to begin with.

What is the nature of usable space? What does it look like? What does it contain?

Contemplate “dog.” You might envision a Chihuahua, a pointer, a setter, a lab, a Pekingese, a wolfhound, a Doberman, a Catahouli-leopard shepherd (like my Loni), or one of an endless variety of mixed breeds. Certainly the image of “dog” is one with mind-boggling variation.

“Usable space” is virtually canine in its many, many incarnations. This is not surprising in that bobwhites occur naturally from southern Ontario, Canada, south into Guatemala, and from eastern Colorado east to the Atlantic. They have been introduced in

Oregon, Washington, and Italy. The vast range of bobwhites encompasses habitats of many different configurations and compositions.

But just as dogs have common properties, such as a keen sense of smell, so does usable space, such as some form of low woody cover. I think woody cover is the proper place to begin describing the nature of usable space because during the day bobwhites stop in woody cover for concealment and, during summer, for cooler temperatures. Where they stop governs where they may be when moving. By low woody cover I mean brush. It might range from persimmon (*Diospyros* sp.) in Florida to plum (*Prunus* sp.) in central Oklahoma to sumac (*Rhus* sp.) in north Texas to granjeno (*Celtis pallida*) in South Texas to velvet mesquite (*Prosopis velutina*) in Sonora, Mexico. We find masked bobwhites (*C. v. ridgwayi*) in Sonora.

Usable space has the proper quantities of woody and herbaceous cover (openings) laid out such that certain distance conditions are met. Field results from north Texas indicate acceptable canopy coverage of woody plants is in the range 30–60%. The woody cover in this area was mostly plum and sumac. That leaves 40–70% herbaceous cover. The woody cover needs to be dispersed such that no point in an opening is more than 30 yards from woody cover. Likewise, we desire that no point in woody cover is more than some small distance, say 30 yards, from an opening. This limits the size (area) of brush thickets.

Talk about your canine concepts! What I described in the above paragraph is a rule-based situation with more possibilities than you can imagine. Any of the possibilities, under the rules, are just as good as any other one in that average quail density will be the same for all of them.

Now I must confess that I am speculating to some degree but that speculation is based on information that radioed bobwhites passed along. The canopy coverage values for woody cover (30–60%) are quite high by more traditional standards (5–15%) but, again, we have observed quail living and begetting within the higher range. Indeed, pre-hunting-season density of the bobwhite population exceeded 2 birds/acre in fully usable space in 2 of 3 years of study.

I have yet to mention the nature of herbaceous cover in a usable space sense. Certainly, herbaceous cover may be deficient or excessive. If it is deficient, usable space is lost because bobwhites will not use areas with too little cover. If it is excessive, bobwhites cannot use areas because the cover physically obstructs access. In between these extreme conditions it gets canine again (a lot of variation gives us the same species of cover).

I see perennial grasses such as tobosagrass (*Hilaria mutica*) or little bluestem (*Schizachyrium scoparium*) as the backbone of herbaceous cover. Such grasses weather better during winter than forbs and annual grasses. They are less sensitive to drought than annual plants. Thus, they provide good cover from the end of one growing season to the start of the next one.

Let's go back to 1956 on the Eastern Shore of Maryland for an example of usable space management. Remington Arms has just purchased 3,000 acres of farmland, "nearly all cleared land [that] had been clean-farmed or heavily pastured" (Burger and Linduska 1967:3). The farm supported 5 coveys of bobwhites. Then managers began creating suitable, permanent cover-situations:

- 7.1 miles of hedgerows,
- 14.0 acres of shrubs,
- 8.5 miles of border strips 30 feet wide, and
- 49.4 acres of grass.

In addition, the managers reduced grazing pressure, and 1 farmstead was abandoned. Some fields were fallowed to increase the amount of usable space. Eight years after management began, the farm supported 38 coveys. This was an increase of about 400 birds.

"Management directed at increasing food supplies apparently did not greatly influence bobwhites numbers" (Burger and Linduska 1967:8).

In rangeland settings such as we have in western Oklahoma and north Texas, usable space management boils down to 2 options: (1) add or remove woody cover and (2) increase or reduce the density of herbaceous cover.

The rules given above provide guidelines on woody cover management. If woody canopy cover falls below 30%, more may be needed. Conversely, if it falls above 60%, less may be needed. If any part of a management area is more than 30 yards from woody cover, that part needs woody cover. If any point in woody cover is more than 30 yards from an opening, some woody cover needs to be removed.

The stocking rate of livestock (AUM/acre, say) is the key decision in the management of herbaceous cover. The grazing system doesn't make too much difference. Obviously, reduced stocking is in order if herbaceous cover is deficient, and increased stocking is in order if herbaceous cover is excessive. Excessive herbaceous cover is a rare problem in western Oklahoma and north Texas.

Canonical means "reduced to the simplest and most significant form possible." I have given you a picture of bobwhite habitat management stripped to the bare essentials. I admitted to some speculation on matters such as acceptable canopy coverage of brush and distance relationships. Nonetheless, the general ideas are sound based on my experience and that of other quail biologists. Habitat management under the precepts of the usable space hypothesis is as canonical as it gets.

There is a major implication of the usable space hypothesis. If you manage an area to full usability (maximized space-time), further habitat management may be pointless. This would hold for fully usable areas embedded in space that is not usable.

Further management under these conditions might be fuss and fandangle that is pleasing to man, but to which bobwhites remain indifferent.

Literature cited

Burger, G. V., and J. P. Linduska. 1967. Habitat management related to bobwhite populations at Remington Farms. *Journal of Wildlife Management* 31:1–12.

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