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Rethinking Deer Management in Semiarid Habitats

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Val Lehmann, a noted quail biologist, called South Texas an "unstable utopia." The more I experience the drought and rainfall cycles characteristic of this part of the world, the more I understand what Val meant. When it rains, South Texas is incredibly productive and provides ideal habitat for a variety of wildlife. Prolonged drought, however, brings the "utopia" to an abrupt end. In South Texas, climatic cycles are unpredictable: you don't know when drought will occur or how long it will persist. The variable nature of the South Texas climate creates challenges not faced by biologists in more environmentally stable parts of the US where many deer management concepts were developed.

I can recall deer biologists recommending increased doe harvest during drought. The rationale makes sense: if you reduce the number of deer during drought, the remaining deer will have more to eat. Because deer have more to eat, they will be healthier, mortality will be lower, and reproduction will increase. This idea is based on the classical concept of density dependence, on which most deer population models are based.

Dr. Charles DeYoung, our noted expert on deer population dynamics, recently authored (along with several coauthors) a chapter in "Wildlife Science: Linking Ecological Theory and Management Applications" published by CRC Press dealing with density dependence in deer populations. Density dependence refers to the phenomena in which reproduction and survival of deer decline as density increases, so that at some density, the population size stabilizes. Density dependence is the basis behind the widely held belief that shooting some deer will increase the survival and reproduction of the deer remaining in the population.

Dr. DeYoung suggested in his chapter that deer populations in South Texas may exhibit density dependence during periods of adequate rainfall, and episodes of density independence during prolonged drought. The idea that deer populations may exhibit periods of density independence has implications for deer management that are rather radical for most biologists. One important implication is that if deer populations are density independent during prolonged drought, harvest of deer is additive and is not compensated for by reduced mortality and increased reproduction in the manner normally anticipated by deer managers. In other words, increasing doe harvest during drought might not be a good idea.

If mortality is compensatory, survival of remaining individuals in a population following harvest increases because of increased food availability resulting from reduced population density.

With additive mortality, survival of remaining individuals in a population does not change following harvest. Harvest mortality is added on top of natural mortality (thus, "additive").

My purpose in this article is to offer a habitat-based idea that may lend support to Dr. DeYoung's theory. I hope that by sharing these ideas, you will gain insight into the complexities of the ecology of the South Texas Brush Country and how they may influence management decisions. In my explanation of how Dr. DeYoung's theory may work, I will use the blackbrush-guajillo dominated plant communities that dominate much of South Texas as an example.

In many parts of southwest Texas, browse species such as blackbrush and guajillo form a large part of deer diets. These woody species are often abundant; however, they contain chemicals broadly referred to as secondary compounds that reduce the amount of protein and energy deer can extract when the foliage is ingested. Drs. David Hewitt and Tyler Campbell discovered that a pregnant doe consuming more than 29% of her diet in guajillo may not meet energy needs. This does not mean that guajillo is not good for deer to eat; it simply means that deer will not do well if guajillo comprises the majority of the diet. Deer need to have access to a variety of plant species, including various forbs and mast, to optimize the nutrient content of their diet.

<u>Photo Caption:</u> Management approaches may differ substantially between highly productive habitats (left above) and less productive habitats (left below).

Forbs, generally speaking, are more nutritious than the leaves and twigs of woody plants. When forbs are green and growing, they commonly provide adequate amounts of nutrients for deer to meet protein and energy demands for growth and reproduction. During prolonged severe drought, such as occurred from October 2008 through August 2009, forbs may virtually disappear from the landscape. Deer depend on browse and mast for survival during prolonged droughts. In areas of south Texas where shrubs such as guajillo and blackbrush dominate, the amount of forage available to deer in the form of browse may be greater than the deer population could consume, but it is only a maintenance ration. Deer can survive on a browse diet, but the nutritional quality of the forage may be too low to meet energy needs of pregnant or lactating does. Consequently, reproduction during prolonged drought may not be sufficient to compensate for the portion of the population lost through annual mortality.

Reducing the number of deer will not make more food available if poor quality browse is overabundant and there are few or no forbs available. Perhaps one could argue that by reducing deer numbers, more food would be available once rains came and stimulated forb growth. However, a drought such as the one during October 2008 - August 2009 spans the

time from conception to lactation, and improved nutrition from reducing numbers of deer would not occur until well after the reproductive period. Under conditions such as October 2008 – August 2009, harvest is likely to be an additive form of mortality – it would result in a net reduction in population size and would not be compensated for by increased reproduction. Thus, the decision to harvest does should be based on population size relative to your goals and should not be based on a strategy to deal with drought.

The nature of the deer-habitat interrelationships in the example I present may vary considerably depending on whether or not supplemental feed is provided, soil physical and chemical properties, and livestock grazing management. Supplemental feeding may mitigate the effects of prolonged drought depending on how extensive the feeding program is. In highly productive habitats, forbs may be available in all but the most extreme droughts; harvest may never or only rarely be additive in these habitats. Land use may also influence population behavior - drought effects are magnified on ranches that are badly overgrazed (photo-right).

Variation in rainfall and variation in vegetation, climate, soils, and other habitat components from one location to the next complicates management decisions in the diverse landscape of South Texas. The more we understand the interrelationships among deer and habitat variables, the better we will be able to manage both. Attempting to understand the mechanisms underlying deer population responses by posing hypotheses is part of the process of increasing our understanding of how these diverse systems function.

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