Wildlife

DEER POPULATION DYNAMICS: CRLRC AND NEW MEXICO.

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DEER POPULATION DYNAMICS: With growing concern of declining mule deer populations, there is a need to determine the population rate-of-increase for deer herds across the West. A deer population rate-of-increase (?) can indicate an increasing population (? > 1), a stable population (? = 1), or a decreasing population (? < 1). Population rate-of-increase is driven by adult doe survival (S_D) and by production and survival of fawns (productivity). Managers estimate productivity by estimating recruitment ratios – the number of fawns per 100 does in April ($F:D_{Apr}$). Population rate-of-increase is given by the following equation:

$$? = S_D + ½ \times (F:D_{Apr})$$

For example, annual survival of adult does in a deer population was estimated to be 90% (S_D = 0.90) and surveys conducted in April estimated there were 30 fawns for every 100 does ($F:D_{Apr}$ = 30:100 = 0.30). Population rate-of-increase can then be determined as:

$$? = 0.90 + ½ * (0.30) = 1.05$$

This tells us the deer population increased 5% over the biological year (April '03 to April '04).

WHAT IS IMPORTANT TO MONITOR?

***For determining population growth,* it is important to monitor both adult doe survival and productivity (fawn:doe ratios). Doe survival tends to change very little from year to year and is usually in the 85-90% range. However, fawn:doe ratios may vary greatly each year based on doe condition (a product of habitat quality), weather, previous years success in raising fawns, predation, disease, and many other factors including level of grazing. Determining which factors are limiting rate-of-increase can be complicated and requires years of monitoring multiple factors.**

***For harvesting bucks*, it is important to monitor adult doe survival, productivity (maximum sustainable mortality rates can be determined from fawn:doe ratios), and the age-structure of bucks in the population. Buck age-structure tells us how hard ALL mortality (including hunter harvest) is affecting adult bucks. Age is one of the three influences affecting trophy status of bucks – they need to reach about 6-½ years to achieve peak antler growth. The other two factors are nutrition (needs to be superior to realize potential) and genetics (only expressed if age and nutrition are optimal).**

Buck age-structure is driven by the adult buck mortality rate. Therefore, adult buck mortality rate (M_M) can be predicted by buck age-structure. The percent of yearling (1½-year-old) bucks in the pre-hunt population (%*Y*) is approximately equal to adult buck mortality.

$\%Y \tilde{} M_M$

For example, if your preseason surveys indicate 60% yearling bucks in your population, then the approximate annual adult buck mortality rate is 0.60 or 60%. Figure 1 gives an idea of how adult buck mortality rates affect the production of trophy bucks. Remember, buck antler development peaks at about 6-½ years.

If M_M = 0.30 then = 17% of bucks will reach age 6-½

If M_M = 0.50 then = 3% of bucks will reach age 6-½

If M_M = 0.70 then = 0.2% of bucks will reach age 6-½

Why not just monitor buck:doe ratios to set harvest rates? **Though useful, buck:doe ratios are a product of both adult buck- and doe- mortality. Because of this, changes in EITHER will change the buck:doe ratio. Thus, buck:doe ratio alone tells nothing about the potential survival of bucks into older age classes.**

THE CRLRC AND NEW MEXICO:

Efforts to determine deer population dynamics on the CRLRC have begun with aerial surveys from a helicopter in April 2005. These surveys were flown in order to determine buck:doe and fawn:doe ratios and to record group sizes and habitat characteristics of all deer groups observed. Population rate-of-increase can be determined from fawn:doe ratios and adult doe survival. Population size of deer on the CRLRC can be determined from deer numbers counted, corrected for factors influencing deer sightability (group size and vegetation type).

Results thus far indicate the minimum population of deer on the CRLRC is 369 (actual number observed). After correcting for sighting probabilities based upon group size and vegetation type, the estimated population size is 495 deer. Analysis indicated that, overall, about 89% of deer on the CRLRC were actually observed during survey flights. The fawn:doe ratio was observed to be 45:100, indicating there were roughly 22 female fawns per 100 does in the population to replace adult female mortality. If adult doe survival is assumed to be 86% (estimated from data collected in the San Andreas Mountains and Colfax county), population rate-of-increase for deer on the CRLRC can be calculated as:

$$? = 0.86 + ½ * (0.45) = 1.07$$

This rate-of-increase is comparable to those observed in other parts of New Mexico for the 2004-05 biological year (Table 1). Deer populations increased about 7% on CRLRC, 7% in the San Andreas Mountains, and 5% in Colfax County. In 2003-04, deer populations had *declined* 3% in the San Andreas Mountains and 5% in Colfax County. In Colfax County in 2002-03, deer populations declined by 34%, and the doe survival rate of 66% was the LOWEST ever recorded. Recruitment completely failed due to severe drought AND long-

term changes in vegetation composition. No radio-tagged fawn lived longer than 28 days. Mortalities were due to malnutrition (does) and non-viability (fawns).

How was this data collected?

1. **Capture and radio-collar does and fawns**
    - **Aerial net-gunning and darting**
2. **Monitor deer for survival and causes-of-mortality**
    - **Monitor radio-collared deer**
    - **Record habitat use**
3. **Fly autumn and spring composition and population estimation surveys**
    - **Composition data can also be collected from ground and spotlight surveys**
    - **Age-structure data can be collected from ground, spotlight, or harvest age data.**
    - **General trends in populations can also be detected from ground, spotlight, and pellet-group surveys.**

Table 1. Deer population dynamics from research projects on the CRLRC, San Andreas Mountains, and Colfax County. S_D = adult doe survival, $F:D$ = fawn:doe ratio, and ? = population rate-of-increase.

Area	Year	S_D	F:D	?
CRLRC	2004-05	0.86	45:100	1.07
San Andreas	2004-05	0.86	44:100	1.07
	2003-04	0.86	22:100	0.97
Colfax County	2004-05	0.91	29:100	1.05
	2003-04	0.90	5:100	0.95
	2002-05	0.66	0:100	0.66

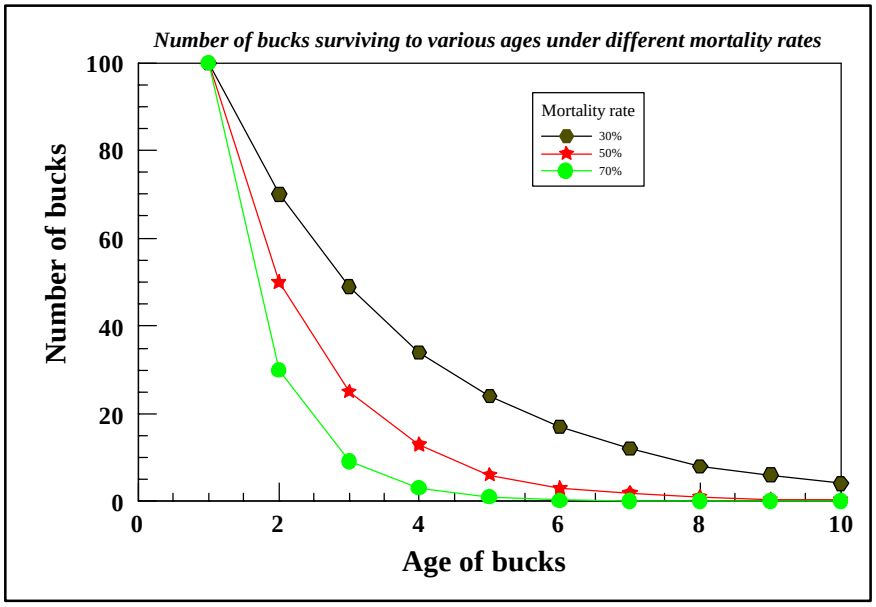

Figure 1. Effects of different adult buck mortality rates on buck age structure.