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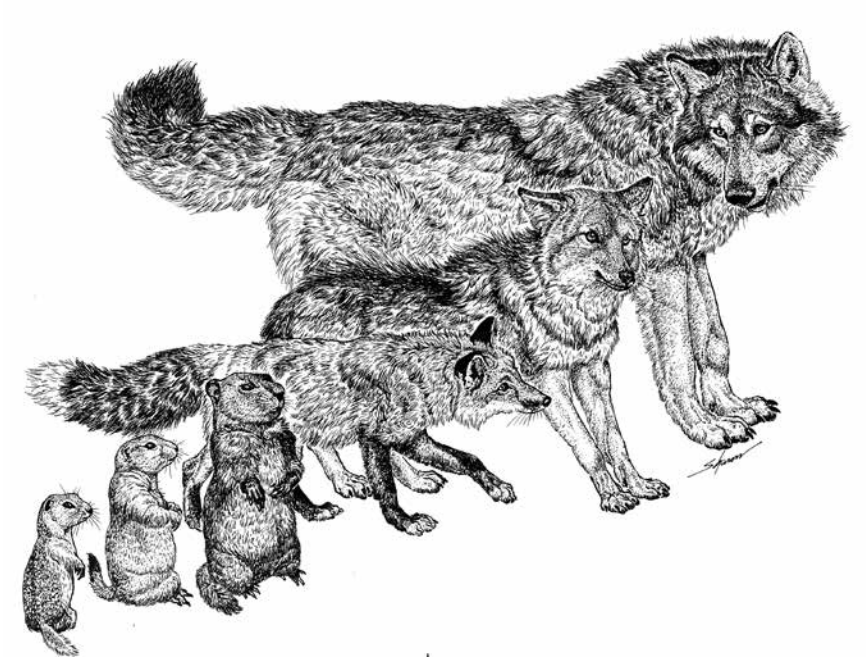

CHAPTER 3

Varmint Rifle Accuracy Versus Target Size and Distance

The evolution of cartridge design and the development of powders, bullets, and rifles capable of delivering exceptional accuracy have generated considerable enthusiasm for engaging varmints at distances beyond 300 yards (Mace, 1996; Hanson, 1999). However, while technology has improved, critter size has remained a constant. Also, while there is more discussion in the literature focused on long-range shooting, it is questionable as to whether shooter ability has improved in recent years. Thus, the important variables of accuracy, varmint size, and distance — plus wind — still determine the percentage of successful shots in any given situation. In this chapter, we will look at the likelihood of

a successful shot on varmints ranging in size from ground squirrels to wolves, given some knowledge of rifle/cartridge performance, shooter capabilities, wind effects, and distance to the target (Figure 3.1).

ACCURACY, GROUP SIZE, SHOOTER ABILITY, AND WIND

A fundamental requirement for estimating the likelihood of successful long-range shots at small varmints is the ability to quantify group size based on known or estimated rifle/cartridge performance, shooter ability, and wind deflection (or "drift"), and to relate target size to group size at the estimated or measured distance to the target. In statistical terms, group size is a measure of the repeatability or precision of shots, whereas accuracy denotes the proximity of the group (or shots) to the designated aiming point or target. Consequently, it is quite possible to have a rifle that shoots tight groups, but due to incorrect sight settings, wind, or other factors, the group is displaced from the intended target. A group (or shot) in such circumstances is not accurate. In the following discussion we will take some license with the term *accuracy* — us-

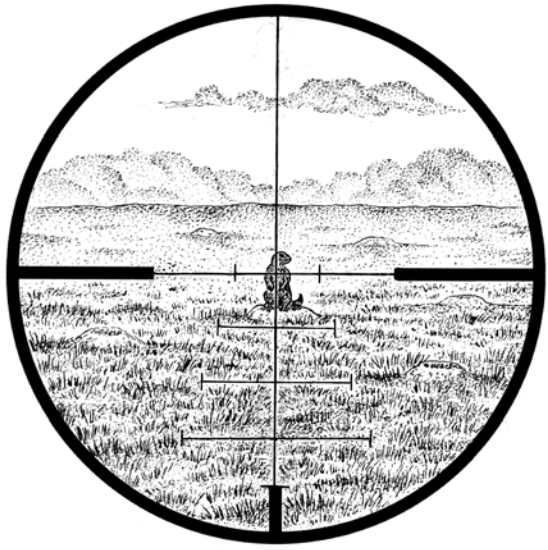

FIGURE 3.1 A successful shot on small varmints requires an accurate rifle/scope combination, knowledge of the distance to the target, and an ability to compensate for wind deflection.

ing it as most rifle shooters do to reflect the size of groups, as well as to indicate the proximity of a shot or group to the point of aim. (See Appendix A).

Accuracy, specified in terms of the size of three- or five-shot groups at 100 yards is measured in inches, centimeters, or minutes of angle (MOA) between the centers of shots of greatest separation — that is, the extreme spread. For our purposes, minutes of angle is a convenient unit of measure, where linear distances of 1.05 inches (1.047 inches to be exact) on the target at 100 yards, 2.10 inches at 200 yards, 3.15 inches at 300 yards, and so forth, subtend 1 MOA.

Group size tends to enlarge as the number of shots forming the group is increased. Typically, the diameter of a five-shot group will be approximately 40 percent larger than a three-shot group, and a 10-shot group may more than double the size of a three-shot group. It is not unusual for sub-MOA three-shot groups to expand to more than 1 MOA when five shots are included. Consequently, when comparing varmint rifle/cartridge performance, the size of three-shot groups, while valuable, may provide unduly optimistic assessments of long-range accuracy potential.

Two other problems may occur when assessing long-range accuracy potential: 1) any small errors at the sight-in distance of 100 or 200 yards will be magnified proportionally as distance increases; and 2) rifle/cartridge combinations that consistently produce sub-MOA groups at 100 yards may not do so at longer distances. Consequently, some consideration should be given to both sight adjustment errors and accuracy deterioration with distance — slight though they may be.

The shooter's ability to maintain a steady hold and consistently squeeze off accurate shots depends on position, rifle stock configuration, rifle weight, trigger-pull weight, scope magnification, and reticle design. With typical heavy varmint rifles and portable benchrests or bipods used from the prone position, shooters under field conditions should be able to hold within a circular area of about 0.25- to 1-MOA diameter (or 0.12- to 0.50-MOA radius) the majority of the time (Figure 3.2). With a solid sitting position aided by shooting sticks or sling sup-

FIGURE 3.2 The San Angelo portable benchrest used with a front rest and sandbags permits this shooter to stabilize his hold and engage prairie dogs to beyond 500 yards with a custom rifle chambered for the 6 mm Remington cartridge.

port, an experienced shooter can contain the wobble to within 1 to 3 MOA (or 0.5- to 1.5-MOA radius). Without sticks or sling, steadiness degrades significantly. A good standing shot can restrict the wobble area to within about 4 to 6 MOA (or 2- to 3-MOA radius) the majority of the time, but for most shooters these values will double. Unlike bench, prone, or sitting positions where trigger control and let-off are much easier propositions, squeezing off shots from a standing position has a much higher degree of uncertainty. Thus, the standing position is not a good option for small varmints typically engaged at distances greater than 100 yards.

Wind is an environmental factor that degrades accuracy, becoming a serious problem as distance is increased. In situations that involve shots at more than 200 yards in crosswinds exceeding 5 miles per hour (mph), wind deflection will amount to several inches. Provided the wind maintains a constant speed and known direction, and terrain effects are

negligible, exact sight corrections are possible. However, this is seldom the case in varmint hunting situations. Although shooters may move their sights or hold points and employ special scope reticles in attempts to correct for wind deflection, the difference between a nominal correction value and the value required for wind conditions at the exact moment the shot is fired is an uncertainty that exists. We will examine accuracy and this uncertainty in more detail below.