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See Picture Below

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POPULATION DYNAMICS OF FERAL BURROS AT THE NAVAL WEAPONS CENTER, CHINA LAKE, CALIFORNIA

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The feral burros (*Equus asinus*) roaming the southwestern United States are native to northeastern Africa and were introduced to North America in the early 1500's by Spanish explorers. Since then, burros were valued by explorers, prospectors, miners, and sheepherders. With the decline of mining and improvements in transportation modes, burros escaped from loose confinements or were set free. Burros are adapted to aridity and eat a wide range of vegetation. Predators are few and diseases or parasites are of little importance. These facts, coupled with the burro's high reproductive rate, led to their becoming widespread throughout most of the western United States (McKnight, 1958).

Most research on burros has focused on their behavior and competition with native species, while only limited information is available on demography (Moehlman, 1974; Norment and Douglas, 1977; Ohmart et al., 1975; Potter and Berger, 1977; Seegmiller and Ohmart, 1981; Walker and Ohmart, 1978; Walter and Hansen, 1978; White, 1980; Woodward, 1976; and Woodward and Ohmart, 1976). This study provides the largest data sample ever investigated for burro population dynamics and provides realistic values with which to present population models.

The study area, the Naval Weapons Center (N.W.C.), is located on the northern edge of the Mojave Desert approximately 190 air km NE of Los Angeles, CA. The N.W.C. is divided into two main sections, the China Lake Test Range complex to the west, and the Mojave B Test Ranges to the east and south. Together these areas cover 4,434 square km of desert land within Kern, Inyo, and San Bernardino counties. Most land between the N.W.C. holdings is administered by the Bureau of Land Management (B.L.M.) and, as there are no boundaries prohibiting burro movement, these approximately 2,383 square km are included in the study area.

In 1980, the N.W.C. population of feral burros was estimated to be between 3,500 and 5,700 animals. To reduce safety hazards presented by the burros, the Navy initiated an emergency removal program. This program began in the winter of 1980 and continued throughout 1981. A total of 864 burros was rounded up and 649 others were shot. The Navy provided reliable data on 1,245 of these and this constitutes the baseline sample. These data include the results of 632 autopsies.

Following initial removal, a program for continued removal of burros was initiated. In 1982, 2,441 burros were removed from the study area. Data provided by B.L.M., Fund for Animals, and the National Organization for Wild American Horses (N.O.W.A.H.) accounts for 2,013 burros and is used as the second sample. The 1983 removal program reduced the N.W.C. population by 1,656, and B.L.M. and N.O.W.A.H. provided data for 1,203 burros (the third sample).

Most burros removed were collected by direct round up procedures during winter or were trapped at watering holes in summer. All were aged and sexed. Ages were determined by examining eruption, replacement, and wear of teeth as in the horse (Davis 1966; Woodward, 1976).

Pregnancy rate was estimated visually, a method reliable only for late term pregnancies that underestimates actual rates. Accurate pregnancy data were collected on autopsied burros (632) in 1981.

The three samples (baseline, 1982, and 1983) provided counts of 1,245, 2,013, and 1,203 burros, respectively. The 1982 sample was limited to 1,555 burros for age specific analyses, as one subset of data did not provide specific ages. Each sample is assumed to be a random sample of the N.W.C. population based on knowledge of the social structure of feral burros (Moehlman, 1974; Seegmiller and Ohmart, 1981; Woodward, 1976). Sampling bias is considered to be negligible as 95% of the total population was removed.

Each sample was collected separately and sequentially, thus making it impossible to follow a cohort through time. Life table analyses were therefore approached by the time-specific method. To generate life tables, the abundance in each age class x must be equal to or greater than that of age class $x+1$, and since this requirement was not met, the data were smoothed using the method of moving averages (Waugh, 1952); three-year intervals were used. This resulted in some loss of accuracy and was effective only through 9 years of age.

Annual rates of increase for burro populations are reported to range from 1.2 to 29% (Morgart, 1978;