CHEMOSTERILANTS AS A MANAGEMENT OPTION FOR DEER ON ANGEL ISLAND: LESSONS LEARNED

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ABSTRACT.

Chemosterilant implantation of captive animals to reduce reproduction has led to the consideration of this technique as a method to control deer herds in urban and park situations. The San Francisco Society for the Prevention of Cruelty to Animals (SFSPCA) proposed to implant a chemosterilant, melangestrol acetate (MGA) into 80-90% of the does on Angel Island. A lowered natality rate and subsequent reduction in total deer numbers were projected. After two months of effort, only 30 does (approximately 30%) had been implanted. Despite the sterilization effort, the projected 1985 population on the three hundred hectare island will be over 300 animals. The high cost and low capture success of the project cast doubt on the efficacy of the procedure as a wildlife management technique.

INTRODUCTION

Angel Island is located in San Francisco Bay approximately one kilometer southeast of the Tiburon Peninsula. The vegetation on the 300 hectare island can best be described as a coastal chaparral community (Ripley 1969). Elevations range from sea level to 238 meters, with steep slopes and very rugged terrain throughout much of the island (California Dept. of Parks and Recreation 1979).

The black-tailed deer (*Odocoileus hemionus columbianus*) inhabiting Angel Island have experienced several population fluctuations during the past thirty years. Several management techniques, including shooting, feeding, and relocation, have been tried with mixed results (Goldsmith 1982, O'Bryan and McCullough 1985). The most recent increase in the deer population prompted a proposal by the San Francisco Society for the Prevention of Cruelty to Animals (SFSPCA 1983) to reduce and stabilize the herd using chemosterilant implants.

Mechanical or chemical birth control as a method for wildlife population control has been tried with mixed results. These methods have proven unreliable or unfeasible for long-term population control of white-tailed deer (*Odocoileus virginianus*) (Harder and Peterle 1974; Matschke 1975, 1976, 1977a). Several steroids, primarily DES (diethylstilbestrol), MGA (melangestrol acetate), and DRC-6246 (17α-allyl-17β-hydroxy-3-oxo-estra-4,9,11-triene) have been given orally with varying degrees of success. Other methods of drug delivery provided promise for the use of chemosterilants in population control of wildlife species (Bell and Peterle 1975; Matschke 1977b,c; Roughton 1979). Matschke (1980) tested DRC-6246 in silastic tubes placed subcutaneously; the implant supressed ovulation in white-tailed deer for only two breeding seasons, making it impractical for use in free-ranging deer. Seal et al. (1975, 1976) showed the effectiveness of MGA in silastic tubes with only minimal secondary effects on other endocrine systems. They believed that by varying the amount of drug and shape of the implant, sterility could be extended for several years.

This paper examines the effectiveness of the Angel Island hormonal implant project. Hopefully, this information will be useful when evaluating future chemosterilant implant proproposals for other wildlife populations.

MATERIALS AND METHODS

Volunteers, organized and trained in early 1984, were used to trap the deer. The services of several veterinarians were enlisted to perform the surgery on captured does. A pilot project utilizing the trained volunteers and veterinary personnel was completed in July, and full scale operations took place from August to October. Deer were captured using 16 pipe frame net traps (Clover 1954, 1956; McCullough 1975). Traps were set after visitors left the island in late afternoon. They were checked twice each day, evening and early morning, before park visitors arrived. Traps were placed throughout the island and were moved periodically to enhance trapping success. A variety of bait was used, including green alfalfa, apple pulp, molasses-flavored grain, acorns, yucca flowers, and green shoots. Trapped deer were physically restrained, and females were sedated with 10-30 mg xylazine administered intravenously. Implants, provided by Dr. U. S. Seal, consisted of a cylindrical silastic tube (1 x 4 cm) containing approximately one gram of MGA. The implant was surgically placed in the muscle tissue of the right shoulder. After surgery, the anesthetic was reversed with 3-5 mg Yohimbine adminstered intravenously. When muscle coordination returned, the animal was released. The entire process took less than 20 minutes. All captured animals, regardless of sex, were marked with color-coded ear tags to permit individual identification.

RESULTS

A total of 1,456 trap nights of effort resulted in 205 captures. Thirty does (15 adults, 15 fawns) were implanted and no implant rejections were observed. Thirty-seven bucks were captured and tagged. Recapture was common. Three fatalities resulted from handling: one female adult, one female fawn, and one male fawn (SFSPCA 1985).

DISCUSSION

The sterilization of 15 adult does will reduce the 1985 fawn crop by 20-25 deer (Figure 1). Based upon a 1985 pre-fawning population of 210-240 animals (McCullough and Fowler unpubl. data), the population is projected to increase to over 300 animals by early summer, despite the sterilization project.

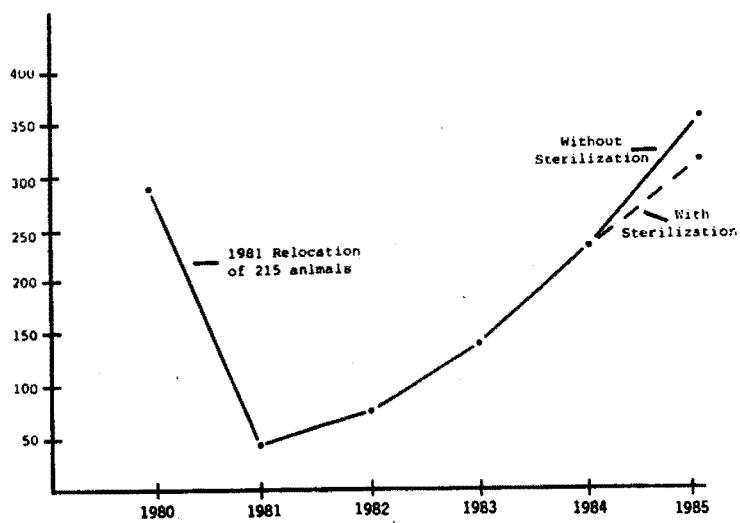

FIGURE 1. Deer population on Angel Island for the last five years and the 1985 population projection both with and without the 1984 sterilization project.

An effective wildlife population control technique should be inexpensive and maintain the population at the desired level. The total cost of the chemosterilant implant project to the SFSPCA was approximately $30,000. This figure is, however, misleading. The majority of the personnel used were volunteers, gratis housing was provided by the Department of Parks and Recreation, and food for the volunteers was donated.

The major costs to the SFSPCA were for materials and construction of the 16 traps, salaries of the veterinarians and project leaders, and for drugs and medical supplies. A State or Federal agency, undertaking a similar project without the use of volunteers, would have higher costs. For example, during the 1981 relocation, $47,000 of the $63,000 cost to the California Department of Fish and Game was for salary and travel expenses.

Ishmael and Rongstad (1984) compared costs of several capture techniques and found the average cost (including bait, labor, equipment and travel) was $411.96 per deer captured alive and $73.95 per deer removed by shooting. The cost for the sterilization project ($477.76 per animal captured) is comparable to the cost reported by Ishmael and Rongstad (1984) for live-captured deer. However, the SFSPCA realized costs of approximately $1,000 per implanted doe. Despite the use of volunteers and donations, this cost generally is considered prohibitive for projects of this type. Without the use of volunteers and without donations, costs would have been even higher.

In addition to the high costs of the project, other serious questions persist about the project's ability to reduce and then maintain the population near carrying capacity. The proposal (SFSPCA 1983) predicted a reduction in deer numbers through natural mortality and reduced natality over several years, with a resultant stable population near carrying capacity. The proposal also recognized the need for periodic captures and implantation to maintain the lowered natality.

The model used to predict these results (SFSPCA 1983) was based upon four major assumptions: (1) a 1983 (pre-fawning) population on Angel Island of 88 animals, (2) a birthrate of 1 fawn per doe, (3) a life expectancy of 6 years, and (4) natural mortality affected all age classes equally. Based upon these assumptions, the model required that 80-90% of the does be sterilized to achieve population reductions.

Prior work on the island (CDFG unpubl. data) indicates these assumptions were unreasonable and would be more accurately stated as: (1) a 1983 population of 130 deer, (2) a birthrate of 1.5 fawns per doe, (3) life expectancy of 12 years, and (4) lower mortality in 2-7 year old deer.

Despite the model's unrealistic assumptions, the project didn't succeed because a sufficient number of does were not captured. This emphasizes one of the major drawbacks of the technique: the difficulty of capturing many animals when deer are not starving.

The estimated carrying capacity on Angel Island is 30-35 animals, based on Taber and Dasmann's (1958) work on deer in chaparral. Experience on the island has shown that at least twice this level can be supported under good weather conditions (CDFG unpubl. data). The 210-240 animals on the Island at the time of the project would be considered extremely high even under the best of conditions. However, even with the high population level, the SFSPCA was able to capture only 30 does. At lower population levels far fewer deer would likely be captured, and the effect of implantation would be even more insignificant.

The problem presents a paradox. When the population is low and sterilization might stabilize the population, sufficient deer cannot be captured. It is only when the population is very high and animals are starving that they can be efficiently captured. However, at such high levels, it is neither desirable nor possible to stabilize the population.

The present situation on Angel Island cannot continue; the habitat will not sustain 200-plus deer indefinitely. As the habitat deteriorates, density-dependent mortality processes will result in a population crash. Even under the most favorable of circumstances, the current use of chemosterilants on Angel Island will delay the predicted crash a few years.

CONCLUSION

The implantation of deer with MGA can prevent ovulation for several breeding seasons. However, the knowledge gained from the Angel Island project indicates that the dynamics of deer populations, difficulties involved in trapping, and high costs limit the usefulness of chemosterilants in long-term wildlife population management.

LITERATURE CITED

Bell, R. L. and T. J. Peterle. 1975. Hormone implants control reproduction in white-tailed deer. Wildl. Soc. Bull. 3: 152-156.

California Department of Parks and Recreation. 1979. Resource Management Plan, General Development Plan, and Environmental Impact Report. Calif. Dept. Parks and Rec., Sacramento. 137 pp.

Clover, M. R. 1954. A portable deer trap and catch net. Calif. Fish and Game 40: 367-373.

_____. 1956. Single-gate deer trap. Calif. Fish and Game 42: 199-201.

Goldsmith, A. E. 1982. The Angel Island deer herd: a case history of wildlife management controversy. Cal-Neva Wildl. Trans. 1982: 78-82.

Harder, J. D. and T. J. Peterle. 1974. Effect of diethylstilbestrol on reproductive performance of white-tailed deer. J. Wildl. Manage. 38: 183-196.

Ishmael, W. E. and O. J. Rongstad. 1984. Economics of an urban deer-removal program. Wildl. Soc. Bull. 12: 394-398.

Matschke, G. H. 1975. Oral acceptance and antifertility effects of microencapsulated diethylstilbestrol on white-tailed does. Proc. Southeast Assoc. Game and Fish Comm. 29: 646-651.

_____. 1976. Non-efficacy of mechanical birth control devices for white-tailed deer. J. Wildl. Manage. 40: 792-795.

_____. 1977a. Microencapsulated diethylstilbestrol as an oral contraceptive in white-tailed deer. J. Wildl. Manage. 41: 87-91.

_____. 1977b. Antifertility action of two synthetic progestins in female white-tailed deer. J. Wildl. Manage. 41: 194-196.

_____. 1977c. Fertility control in white-tailed deer by steroid implants. J. Wildl. Manage. 41: 731-735.

_____. 1980. Efficacy of steroid implants in preventing pregnancy in white-tailed deer. J. Wildl. Manage. 44: 756-758.

McCullough, D. R. 1975. Modification of the Clover trap. Calif. Fish and Game 61: 242-244.

O'Bryan, M. K. and D. R. McCullough. 1985. Survival of black-tailed deer following relocation in California. J. Wildl. Manage. 49: 115-119.

Ripley, J. D. 1969. A floristic and ecological study of Angel Island State Park, Marin County, California. M.A. Thesis, California State University, San Francisco. 113 pp.

Roughton, R. D. 1979. Effects of oral melengestrol acetate on reproduction in captive white-tailed deer. J. Wildl. Manage. 43:428-436.

San Francisco Society for the Prevention of Cruelty to Animals. 1983. Proposal for using hormone implants to control reproduction of black-tailed deer on Angel Island. SFSPCA, San Francisco, CA. 10 pp.

_____. 1985. A report on the 1984 Angel Island deer sterilization project. SFSPCA, San Francisco; CA 10 pp.

Seal, U. S., R. Barton, L. Mather, C. W. Gray and E. D. Plotka. 1975. Long-term control of reproduction in female lions (*Panthera leo*) with implanted contraceptives. Proc. Ann. Mtg. Am. Assoc. Zoo Vet. 1975: 66-80.

_____, R. Barton, L. Mather, K. Olberding, E. D. Plotka and C. W. Gray. 1976. Hormonal contraception in captive female lions (*Panthera leo*). Zoo. Animal Med. 7: 12-20.

Taber, R. D. and R. F. Dasmann. 1958. The black-tailed deer of the chaparral. Calif. Dept. Fish and Game, Game Bull. 8: 1-163.