DEMONSTRATION ELECTRIC FENCES TO CONTROL BLACK BEAR DAMAGE TO APIARIES IN NEW YORK STATE

Janet L. Sillings[1/] Thomas N. Tomsa, Jr.[2/] James E. Forbes[3/]

ABSTRACT

The New York State black bear (Ursus americanus) population, approximately 4,000 animals (Clarke 1977), causes damage to apiaries in the Catskill, Adirondack, and Southern Tier regions of the state. During 1987, 1988, and 1989, USDA Animal Damage Control (ADC) administered a program in New York to control bear damage to apiaries. Control activities were carried out pursuant to a Cooperative Agreement between ADC and the New York State Department of Agriculture and Markets, and were supported by matching Federal-State contributions. Program objectives were beekeeper education aimed at preventing bear damage and for the construction of demonstration temporary electric fences.

During 1987, an 8-wire, low-tension fence of 12.5 gauge wire used in conjunction with a high-voltage, low-impedence New Zealand energizer was constructed around an apiary in Clinton County. In 1988, two fences were built in Steuben County: an 8-wire, low-tension fence of 14 gauge stainless steel braided cable used with a 110 volt energizer connected to a nearby utility pole, and a 3-strand polytape fence used with a solar-charged 6-volt energizer. In early 1989, a 42-inch high polywire mesh fence, used with a solar 6-volt energizer, was installed at another Steuben County site. The polytape fence is considered the most desirable because of effectiveness, relative low cost, portability, ease of installation, and compatability with the polar 6-volt energizer.

1/ USDA-APHIS-ADC, P.O. Box 97, Albany, NY 12201-0097

2/ USDA-APHIS-ADC, RD #1, Box 79, Old Kanonah Rd., Avoca, NY 14809

3/ USDA-APHIS-ADC, P.O. Box 97, Albany, NY 12201-0097

ACKNOWLEDGMENTS

Thanks go to Tom Tomsa, USDA-ADC, District Supervisor, Avoca, New York, who provided information and insights on bear fencing at apiaries and critically reviewed this manuscript. Additional thanks to Rick Owens and Rene Bollengier, ADC Assistant Eastern Regional Director, Brentwood, TN, and Concord, NH, respectively, for assistance in preparing this manuscript. Special thanks go to Mr. Ian McMurchy Wildlife Branch, Saskatchewan Parks and Renewable Resources, for literature, training materials, recommendations and advice regarding the use of solar electric fences to control bear damage to apiaries.

We would like to acknowledge the New York State Department of Agriculture and Markets, Division of Plant Industry for financial support.

Special thanks go to the four beekeepers in western New York for cooperation and maintenance of electric fences.

INTRODUCTION

The New York State black bear (Ursus americanus) population of approximately 4,000 bears causes damage to apiaries in areas of the state where bear habitat overlaps productive bee pasture. During 1987, 1988, and 1989 the United States Department of Agriculture, Animal and Plant Health Inspection Service, Animal Damage Control (ADC) administered a program to control bear depredation at apiaries. Control activities were carried out pursuant to a cooperative agreement between ADC and the New York State Department of Agriculture and Markets, Division of Plant Industry, and were supported by matching Federal-State contributions. Program objectives were beekeeper education aimed at preventing bear damage and the construction of demonstration temporary electric fences.

Activities were conducted out of the ADC district office in Avoca, New

York, by District Supervisor Tom Tomsa and seasonal technicians.

BACKGROUND

New York State supports the second-largest black bear population in the eastern United States (Clark 1977). In New York, bears generally inhabit three distinct ranges, totaling approximately 10,670 square miles (Table 1) (Clark 1977). The 9300 square mile Adirondack range supports a relatively stable population of approximately 3500 bears, with smaller populations of approximately 300 and 50 occupying the 1270 square mile Catskill range and the 100 square mile Allegheny range, respectively (Figure 1). Most bears are jet black and are generally found in mountainous forested range. Adult males average 300 pounds, and females, 150 pounds (Clark 1977).

TABLE 1. Major bear ranges in New York State (Clark 1977)

Range	Size (Sq. Mi.)	Bear Population
Adirondack	9300	3500
Catskill	1270	300
Allegheny	100	50

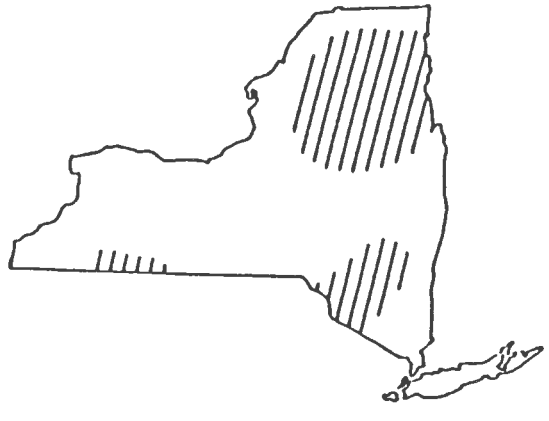

FIGURE 1. Major black bear ranges in New York (Clark 1977)

In 1988, honey production from beekeepers with five or more hives in New York State totaled 5.55 million pounds; at $0.69 per pound, the total value of honey produced in the state was $3,827,000 (Anonymous 1989). In 1987, 3,960,000 pounds of honey from 90,000 colonies yielded a total value of $2,614,000 (price per pound, $0.66) (Anonymous 1989). The western area of Steuben, Allegheny, Livingston, Ontario, and Erie Counties, and the northern sections of Jefferson, St. Lawrence, Franklin, and Ontario Counties, are the primary beekeeping regions in New York State (Figure 2).

In western New York, much of the rugged sections of the Southern Tier were abandoned as farmland in the early 1900's, and are now approaching a mature forest stage (Fuerst 1988). Field sightings of greater numbers of females with cubs suggest that the region's bear population may be growing (Fuerst 1988). The three bear ranges lie primarily within marginal or submarginal beekeeping regions. Where bear habitat and beekeeping regions overlap, bear damage to apiaries can cause serious economic losses to individual beekeepers.

To facilitate discussion of bear damage at apiaries, and to control damage, it is essential to have an understanding of the basics of beekeeping. Bees are raised in apiaries, which are frequently located in abandoned farming areas, with a source of water and located close to fields of flowering plants, such as goldenrod or clover. Beehives consist of a plywood base and top, and boxes called supers (Figure 3). Throughout the spring and summer, supers are stacked on top of each other to accommodate the growing bee population in the colony. Inside each super are ten hanging wooden frames. Frames have a wire framework that supports a wax foundation ("foundation frames"). Bees build their six-sided cells with the wax and use them for storage of honey and pollen ("honeycomb frames"), and for raising young bees ("brood frames") (McMurchy 1988).

FIGURE 2. Major beekeeping regions in New York adapted from the 1986 Annual Report of the Apiary Disease Control Program, New York State Department of Agriculture and Markets Division of Plant Industry (Anonymous 1986).

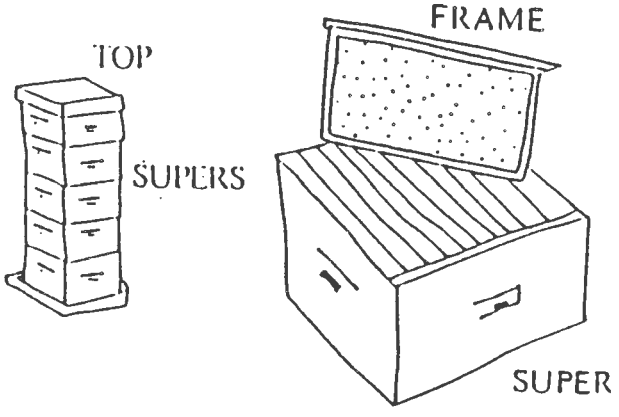

FIGURE 3. Beekeeping equipment and terminology (adapted from McMurchy 1988).

Bears are primarily opportunistic nocturnal feeders. At apiaries, bears are presented with an abundant and accessible preferred food source (Maehr 1983). Plant foods typically consumed by black bears are berries, acorns, beechnuts, and pine seeds, and honey is "sought as a prized delicacy" (Martin, Zim, and Nelson 1951). Animal matter consists primarily of colonial insects such as yellow jackets and honey bees. Bear damage to apiaries is in the form of reduced honey production, loss of the queen, damaged equipment, and labor expended by beekeepers repairing equipment. Bears generally knock over bee hives and eat the larvae produced in the lower supers. They also eat the honeycomb, and damage frames by stepping on them and scraping comb or honey cells from the frames. Damaged frames are generally not reparable, and must be replaced. There are generally three approaches to dealing with bear damage to apiaries: compensation, reaction (moving via relocating or shooting nuisance bears), and prevention (Anonymous 1982). Shooting or trapping and removing problem bears can at best be considered a short-term solution, as an unprotected apiary is vulnerable to damage should another bear pass through the area. Perhaps the most important tool in bear damage prevention around apiaries is the electric fence. Electric fences should be installed early in the spring before bears become accustomed to the food supply.

The use of electric fences to control bear damage at apiaries was first reported in the literature by Storer et al. (1938), who used a system of low secondary voltages accompanied by grounded poultry-netting aprons to assure that the animal received a shock. Johansen (1975, in Wade 1982) reported that high voltage electric fences were effective if the vegetation was controlled and a 24" chicken wire apron was used under the fence. Gunson (1977) found that electric fences were nearly 89% effective in protecting Alberta apiaries from black bears. In Florida, Brady and Maehr (1982) reported a 70% greater probability of bear damage among unfenced beeyards than among fenced yards. The use of electric fences around apiaries is an integral part of bear damage control in the Canadian provinces (McMurchy 1988) and in several states in the U.S. Designs and cost vary, but the keys to effectiveness are proper construction and maintenance (Lord 1979), as well as timing of fence placement.

THE BEAR CONTROL COOPERATIVE PROGRAM

The ADC staff in Avoca, New York verified five bear damage complaints in each of the two years - 1987 and 1988, and one complaint in 1989. A complaint is termed "verified" after the USDA biologist made a site visit and confirmed that the damage was, in fact, caused by black bears. During 1987, a demonstration electric fence was constructed around an apiary in Clinton County, New York, which had sustained chronic bear damage over a number of years. The apiary was situated along a hedgerow, bordering a cornfield which had also sustained serious bear damage. These factors indicated that this location would be a good test site to determine the effectiveness of the bear exclusion fence. The low-tension fence enclosed approximately 400 square feet, consisted of 8 strands of 12.5 ga. galvanized steel wire, spaced at 6-inch intervals from 6" to 48" high, and was supported by fiberglass wingback posts. The fiberglass corner posts were guyed to heavy wooden posts for bracing, eliminating the need for 32 insulators and the possibility of voltage drain due to insulator failure. All 8 strands were charged by a high-voltage, low-impedence New Zealand energizer (12-volt battery powered model). A 24" wide chicken wire ground mat was placed on the ground around the perimeter of the fence, 6" from the plane of the wires, and connected to the charger's grounding system to ensure completion of the circuit. Cost of materials was relatively high at approximately $550. Several disadvantages were associated with the use of high-tensile strength wire in a low-tension application. The weight, bulk and rigidity of the 12.5 ga. steel wire made it more difficult to work with and apply.

During 1988, two demonstration electric fences were constructed using different materials and evaluated in Steuben County. The first was a low-tension fence consisting of 8 strands of 14 ga. stainless steel braided cable. The wire configuration, grounding system, and enclosed area were identical to those described above. Because the 14 ga. cable was more flexible and easy to pull taut, the fiberglass corner posts were guyed to steel T-posts, which were easily driven and that adequately braced the fence. An electric hook-up on a nearby utility pole allowed for the use of a 110V energizer, and eliminated the additional cost and maintenance associated with battery power energizers. Cost of materials was approximately $450.

The second fence installed in 1988 consisted of 3 strands of electroplastic tape ("polytape") supported by 3/8" fiberglass line rods and 1/2" fiberglass corner rods. Polytape is a half-inch wide plastic strip interwoven with four thin steel wires. It is pliable and readily visible to bears. Polytape was spaced at 12", 24", and 36" spacing from the ground. The fence enclosed an area of approximately 400 square feet, and was powered by a solar-charged 6-volt energizer. The tape was baited with bacon fat and/or sardine oil to ensure that the bear was shocked in the muzzle area and repelled before it broke the plane formed by the fence. This type of fencing is successfully used in bear damage abatement by Canadian provincial wildlife agencies. Cost of materials was approximately $210.

In 1989, electroplastic netting (42" high, 4.5" mesh), with 10 charged horizontal strands was used to exclude bears from an apiary in Steuben County. The fence was powered by a solar 6-volt energizer and enclosed approximately 400 square feet. Because line voltages were found to be significantly lower than in the 3-strand polytape fence, it is suspected that the number of charged strands and high degree of ground contact with the bottom strand of the netting made it less effective for use with the solar-powered 6-volt energizer. Cost of materials was approximately $240.

CONCLUSION

The 2-year program reported here provided for the installatiion of four demonstration temporary electric fences to protect apiaries from black bears.

An additional program objective was to provide beekeeper education on the farm and at beekeeper meetings throughout New York State. Temporary electric fences to protect apiaries from bears are important control tools where bear range overlaps productive bee pasture. Temporary fencing that can be easily and quickly installed and removed is necessary for several reasons: 1. annual changes in land use and crop rotation make different areas available for apiaries each year; 2. to identify the most productive bee pasture on a farm, a farmer will move the apiary around to different sites each year; and 3. some farmers rent apiary space on other landowners' property, where they cannot build permanent structures.

During 1987-89, four different electric bear exclusion fence systems were installed and demonstrated in New York under the cooperative agreement. Because the polytape fence was relatively inexpensive, effective, portable, and easily installed, it is considered the most desirable fence demonstrated to date. The low-tension steel cable fence may be desirable in situations where a more permanent fence is appropriate or in those exceptional cases where temporary fencing fails to prevent bear damage.

The energizer that was most effective is the 6-volt Parmak solar-powered model. It is American-made, costs $150 and is readily available in farm supply stores. With this energizer, a beeyard can be fenced at a total cost of just over $200.

LITERATURE CITED

Anonymous. 1982. Preventing bear damage to bee hives. Manitoba Department of Natural Resources. 15 pp.

Anonymous. 1986. Annual Report-Apiary disease control program. New York State Department of Agriculture and Markets Division of Plant Industry.

Anonymous. 1989, Extension News of Albany/Rensselaer, Saratoga/Washington Counties. 17(6):p.21.

Brady, J.R. and D.S. Maehr, 1982. A new method for dealing with apiary-raiding black bears. Proc. Ann. Conf. S.E. Assoc. Fish Wildl. Agencies. 36:571-577.

Clark, S.H. 1977. The black bear in New York State. The Conservationist. VII:1.

Fuerst, G. 1988, May 3. Untitled. The Steuben Courier Advocate, Bath, NY. p.21.

Gunson, J.R. 1977. Black bears and bee hives in Alberta. Proc. Ann. Conf. Western Assoc. Game and Fish Comm. 57:182-192.

Johansen, C. 1975. Bear protection for bees. EM-4005, Washington Coop. Ext. Serv., Washington St. Un., Pullman. 5 pp.

Lord, W.G. 1979. Black bear depredation on honey bees. Am. Bee J. 119:818-821.

Maehr, D.S. 1983. Black bear depredation on bee yards in Florida. Proc. First East. Wildl. Dam. Con. Conf. Ithaca, NY, pp. 133-135.

Martin, A.C., H.S. Zim, and A.L. Nelson. 1951. American wildlife and plants: a guide to wildlife food habits. Dover Publications, Inc., NY, NY 500 pp.

McMurchy, Ian. 1988. Black bear damage prevention and control. Wildlife Branch, Saskatchewan Parks and Renewable Resources. 46 pp.

Storer, T.I., G.H. Vansell, and B.D. Moses. 1938. Protection of mountain apiaries from bees by use of electric fences. J. Wildl. Manage. 2:172-178.

Wade, D.A. 1982. The use of fences for predator damage control. Proc. Vert. Pest Conf. 10:24-33.