Tick-clover plots held as many coveys as did the bicolor patches on the study area. Crop analysis revealed that quail relied on the tick-clover for most of their food in the tick-clover patches where no bicolor lespedeza plots were close by. Hunting in the tick-clover was much easier since it does not grow nearly as high as bicolor.

Tick-clover is considered to be a successful winter food plant and reseeding vetch a successful summer food plant on this quail management area.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the use of land and provision of financial and other aid as well as suggestions by Mr. Hugh Kaul and his land manager, Mr. Louis Weaver, for improving the management of tick-clover. We are thankful to Messrs. Robert E. Waters and Karl E. Graetz of the SCS for providing seed of tick-clover.

LITERATURE CITED

Donnelly, E. D. and E. M. Clark. 1962. Hybridization in the genus *Vicia.* Crop. Sci. 2:141-145.

_____and Carl S. Hoveland. 1966. Interspecific reseeding *Vicia* hybrids for use on summer perennial grass sods in southeastern U. S. A. Proceedings of the X International Grassland Congress. Sect. 3, No. 18. 679-683.

Elkins, D. M., C. S. Hoveland, and E. D. Donnelly. 1966. Germination of *Vicia* species and interspecific lines as affected by temperature cycles. Crop Sci. 6:45-48.

Graetz, Karl E. and W. C. Young. 1960. Clanton tick-clover——a plant material available for field planting. Soil Conservation Service Plant Guide.

Korschgen, Leroy J. 1948. Late-fall and early-winter food habits of bobwhite quail in Missouri. J. Wildl. Mgmt. 12(1):46-47.

McConnell, Chester A. 1965. An evaluation of the utilization of bobwhite quail food plants on an established management area. Unpublished M.S. thesis, Auburn University. 62 pp.

Speake, Dan W. 1966. Effects of controlled burning on bobwhite quail populations and habitat of an experimental area in the Alabama Piedmont. Proc. 20th Ann. Conf. S. E. Assoc. Game and Fish Comm. 19-32.

SMALL FOREST HOLDINGS COULD BE COMBINED FOR HUNTING LEASES

By John J. Stransky and Lowell K. Halls[1]
Southern Forest Experiment Station
Forest Service, U. S. Department of Agriculture

ABSTRACT

Most forest land acreage in the South is in small holdings. Much-needed hunting land, and income for rural landowners, could be provided by combining small forest holdings into large units and leasing the hunting rights.

INTRODUCTION

The present demand for hunting land is expected to double by the year 2000 (Outdoor Recreation Resources Review Commission, 1962). Who is going to supply this extra hunting and how?

In the South, the "who" will most likely be the owners of small forests. There are two main reasons. First, the forest is the natural abode of most upland game species. Even some of the so-called farm game, such as bobwhite, depend upon the forest for

[1]The authors are on the staff of the Wildlife Habitat and Silviculture Laboratory, which is maintained at Nacogdoches, Texas, by the Southern Forest Experiment Station in cooperation with Stephen F. Austin State College.

part of their needs. Second, small landowners own 73 percent of the South's 200 million acres of forest lands (USDA Forest Service, 1965).

The "how" is less obvious. One possibility which we think offers considerable promise is the formation of cooperative hunting leases. Essentially, these are consolidations of several small landholdings combined to form a practical-size hunting unit. Upper-size limits are flexible and may include most small units surrounding a town or may even be expanded to county size.

The idea of land cooperatives is not new. Livestockmen and farmers have used them to advantage for many years in the United States. Recently, a world-wide bibliography on forest cooperatives was compiled (Dempsey, 1967). The idea has also been proprosed as a way to increase production and facilitate timber marketing on small holdings in the South. The cooperative system is widely used in Europe for intensive management and harvesting of game, but to our knowledge it has not been used for this purpose in the United States.

Benefits Landowner and Hunter

The game cooperative would have advantages for both landowner and hunter.

To the landowner the main incentive of hunting cooperatives is economic. Like everyone else, he needs more money. In most cases, however, the individual landholding is too small to lease. Food and cover needs of most game usually extend beyond the boundaries of any one holding. For example, quail may depend on cultivated fields and fence rows for food but scamper to the adjacent woodlands of another landowner when disturbed. In such cases it is difficult for either owner to charge for hunting. Too, the hunter isn't interested in paying to hunt if the population is so small that he can shoot only one or two birds or if he is restricted by no-trespass signs from pursuing the game. These and other handicaps of small units can be overcome by consolidating several holdings.

The gross amount that the landowner can charge will depend on the quality of hunting and services provided. Hunters will naturally pay more when game are abundant, healthy, and accessible. In some highly productive areas the cooperatives may be justified in building blinds, establishing food plots, and furnishing lodging and guide services. Such luxuries are already provided in some of the large land-holding hunting leases.

Currently, the gross return to forest landowners for hunting leases usually ranges for 50 cents to $1 per acre, sufficient in most cases to pay taxes. The trend in hunting costs indicates that lease rates will go up. In some areas of Texas the potential economic return from deer is greater than that from livestock (Ramsey, 1965).

Perhaps the most important feature of this cooperative system is that it provides a profit-making incentive for sound game management on southern forests (Hamor, 1968). On large private holdings this aim has been achieved to some extent. However, millions of acres of small woodlands are currently posted against trespass simply because the landowner has no incentive to let strangers hunt on his land.

The hunter would benefit by having land available——at a price——for his favorite recreation. The present price of leases, the number of applications received by State game departments for hunting on game management areas, and the congested hunting conditions on some public land available for free hunting, give some idea of the current demand and expected pressure for hunting. In many European countries today the "Hunting opportunities wanted" ads far outnumber the "Opportunities offered." The Southern United States might face a similar situation in the not-too-distant future.

Today, when annual income is highest in our history, the hunter seems able and willing to pay for hunting privileges on private land. He doesn't have to line up or take a chance on drawings for permits, or to worry about shooting space. Because of less hunting pressure his success on leased areas is apt to be better than on open public hunting land. He has assurance that some effort will be made to maintain or improve the habitat. Likewise, harvests can be controlled on leases to help assure high-quality big game or dense populations of small game.

The hunting cooperatives would be important in rural rehabilitation because of the money brought in from leases. It is true that many small woodlands are changing from rural to urban absentee ownership. But the new owners may be more interested in recreation than in timber production. If they are, this trend may favor game as part of the recreation complex (Stransky and Halls, 1968).

Opportunities and Problems

Game Cooperatives could come about through the initiative of landowner groups, through sponsorship of State game departments or the Agricultural Extension Service, or perhaps through private consultants. At any rate, the cooperative should include an agreement among the owners as to individual responsibilities and obligations. Similarly, a contract between landowners and hunters should specify lease rates, hunting rules, restitution for damage to property, and accident liability. Sample contracts could be prepared by legal departments of State conservation agencies. With slight modifications, these contracts could then be fitted to individual cases with a minimum of trouble and cost.

To assure good game and habitat management, the cooperatives should seek the services of wildlife professionals. They are qualified to recommend the hunting intensity that is most apt to produce the maximum quality and quantity of a particular game species. They know the food and cover requirements of specific game animals and are thus qualified to suggest ways for improving the habitat and the hunting. And the wildlife biologist, aware of the social habits and range of the game, has a good concept of the size a hunting unit should be. In some cases it may be feasible for a group of hunting cooperatives to employ a wildlife biologist part-time.

There are, of course, many problems and possible pitfalls in the hunting cooperative. The first, and probably most difficult, task is to get a group of people to agree on the organization and its objectives. Legal and economic questions of cost, profit sharing, taxation, liability, and insurance are thorny issues that must be solved. Other problems might arise from the simultaneous management of timber, game, and crops.

A sizable education and public relations job would be needed to make the system acceptable to the small forest owners and the hunters. In order to do this, however, such problems as lease size, length of lease period, costs and returns, and legal aspects should be worked out first on pilot models. Then workable plans could be suggested for implementation of this system.

SUMMARY AND CONCLUSIONS

Most forest land in the South is in small woodlots, which are the main source of food and cover for upland game. Individually, the small landholdings offer little in the way of hunting leases; but as cooperatives they would form practical-size units appealing to the hunter.

Because of profit and recreational possibilities the cooperative hunting-lease system would provide a much-needed incentive for improving game management. From hunting leases the landowner would receive additional income. He thus would be able and willing to improve the habitat. With better habitat the hunting would improve. This would please the hunter, who then would be willing to pay more for this lease.

When set in motion, this series of events would offer a realistic way to meet hunting demands predicted for the South.

LITERATURE CITED

Dempsey, G. P. 1967. Forest cooperatives: a bibliography. U. S. Dep. Agr. Forest Serv. Res. Pap. NE-82, 53 pp. Northeast. Forest Exp. Sta., Upper Darby, Penn.

Hamor, W. H. 1968. Costs and returns of producing wildlife on farmland. J. Soil and Water Conserv. 23(1):16-18.

Outdoor Recreation Resources Review Commission. 1962. Outdoor recreation for America. A report to the President and the Congress. 246 pp. Wash., D. C.

Ramsey, C. W. 1965. Potential economic returns from deer as compared with livestock in the Edwards Plateau Region of Texas. J. Range Manage. 18(5):247-250

Stransky, J. J., and L. K. Halls. 1968. Woodland management trends that affect game in Coastal Plain forest types. Annu. Meeting Southeast. Assoc. Game and Fish Comm., New Orleans, La. 1967:104-108

USDA Forest Service. 1965. Timber trends in the United States. U. S. Dep. Agr. Forest Serv. Forest Resource Rep. 17, 235 pp. Wash., D. C.

CRYO–BRANDING–A MARKING TECHNIQUE FOR WHITE-TAILED DEER[1]

By John D. Newsom *Louisiana Cooperative Wildlife Research Unit*
and
John S. Sullivan, Jr.
Cooperative Extension Service, L.S.U.

INTRODUCTION

In wildlife research animals are marked for one of two basic reasons: (1) for future identification of the animal in hand and (2) for future identification, live, at some distance from the observer.

For birds, small mammals and to a lesser degree large mammals, leg banding, toe clipping, ear tagging, and tattooing have served well as marking techniques for future identification of the animal in hand. However, a completely satisfactory method of marking mammals and birds for future identification, live, and at a distance, has not yet been reported in the literature.

Problems encountered in marking the larger mammals have been particularly difficult, especially in deer. Progulske (1957) describes a leather collar covered with plastic of various colors and patterns which was used in marking white-tailed deer in Missouri. This collar could not be used on very young deer, because if buckled on loosely enough to allow for subsequent growth it could be lost over the head. It also presented a problem in adjusting to the swelling of the necks of bucks during the rutting season. Hamilton (1962) made an expansible collar for deer which solved some of the problems inherent in the non-expansible collar, but was too short-lived for use in long-range studies. Fashingbauer (1962) describes an aluminum collar for female deer and a rubber base plastic collar in concentric coils for bucks. These collars met most of the requirements of a permanent marker, but over ten percent of the collars were lost within nine months. Other authors (Duerre, 1958 and Ealey and Dunnett, 1956) have described variations of the collar which were useful in identifying animals at night.

Other marking devices such as ear streamers and ear tags (Harper and Lightfoot, 1966), and dyes (Webb, 1943) have been used to mark deer with results similar to those attained by the use of collars.

The Cooperative Wildlife Research Unit at Louisiana State University is conducting nutritional experiments with white-tailed deer in which large numbers of deer of different ages and sexes are being used. Future plans call for breeding of different individual strains of deer, at which time it will be necessary to permanently mark individual animals in such a manner that they may be readily recognized at a distance. None of the presently known methods of marking or tagging seemed to fulfill our needs.

Cryo (freeze) – branding is a new method of branding which is currently receiving much attention in the livestock industry (Farrell, 1965 and Miller, 1967).

[1] A joint contribution of the Louisiana Cooperative Wildlife Research Unit, Louisiana State University, Louisiana Wild Life and Fisheries Commission, Wildlife Management Institute and the U. S. Fish and Wildlife Service cooperating and the Cooperative Extension Service, Louisiana State University.