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## MUSKRAT CONTROL AND DAMAGE PREVENTION

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**ABSTRACT:** Although the muskrat, *Ondatra zibethica*, is native throughout most of the United States and has been a mainstay of the fur business, in recent years it has become a serious pest causing extensive damage to some specific crops, as well as to earthen water-holding structures. Damage caused by muskrats to rice crops, food fish, and bait fish reservoirs in Arkansas was estimated in 1967 to be almost \$900,000. A control program begun in October, 1967, directed principally at muskrat control, proved a significant aid in reducing damage. This program provided Arkansas farmers and landowners with practical, effective methods and techniques which could be utilized by them or their labor force to control or eliminate damage attributable to muskrat depredation.

Muskrat populations in Arkansas have shown a marked fluctuation in numbers in recent years in response primarily to the transformation in land use. This population trend has been predominantly upward since just after World War II, a result of a reduction in trapping pressure and a transformation in land use. Although both of these factors have affected the muskrat populations in Arkansas, as have many other minor factors, certainly the changing land use is primarily responsible for the dramatic increase and resulting depredation caused by this dynamic population increase until the late 1960's.

Recent Arkansas history reflects the transformation in land use: Bottomlands have been cleared and drained, marshes have been ditched and drained, crops have changed, and more and more land has been placed into crop production. The muskrat has adapted well to this change in land use; and, in fact, where rice and fish farming are the principal crops, its habitat has been both expanded and improved.

Arkansas has an abundance of natural muskrat habitat with many lakes, both large and small, abundant streams, drainage ditches, farm ponds, and natural marshes, all of which provide the aquatic habitat muskrats need. Add to this natural habitat an average of approximately 500,000 acres annually in the production of rice, food fish, and bait fish, and it is readily apparent that the muskrat suffers little from a lack of habitat.

With the abundance of ideal habitat being supplemented by changing land use, rapidly decreasing fur-trapping pressure, and little if any control measures being implemented, it is easily understood why an animal with the reproductive potential of the muskrat expanded to fill practically all new and existing available niches.

As depredation to rice crops and fish farming increased, more and more pressure was being exerted for an effective muskrat control program. Surveys conducted throughout Arkansas in 1966 pointed out significant damage in 16 counties, estimated to exceed \$801,000. Damage totals per county ranged from \$1,500 to over \$363,000. The same type of survey conducted in 1967 listed 20 counties reporting significant damage and the total figure estimated at almost \$900,000.

Control measures which had been conducted in the state prior to 1967 were limited; and although the methods suggested had been somewhat effective, they could not be implemented widely enough to provide significant damage reduction or population control.

The Arkansas Cooperative Extension Service muskrat control program was begun in October, 1967. It was designed to be an educational process to teach farmers and landowners to control their own muskrat problems, and not to provide them with someone to do it for them. It was stressed from the beginning of this program that it was not directed at muskrat eradication, it could not suggest techniques or control measures which would endanger man, the crops grown, or any non-target species. Unfortunately, an intensive research program could not be undertaken, primarily due to a lack of funds, personnel, and because of the urgent need for control measures. Therefore, the program began with some very basic field, method demonstrations. This field application of various control techniques acquired from extensive literature review, personal communications, and previous experience was accompanied by some brief cage trials of various toxicants, bait acceptance, and efficacy trials.

Live trapping of muskrats, although possible but frustrating with a variety of traps and trapping techniques, was greatly improved with a modification of the box-type trap described by Snead (1950). This type of trap proved to be most successful when adapted to the various habitats and caused little or no damage to the entrapped muskrats.

Field trials were conducted, utilizing all methods and techniques known, to ascertain which of the methods or techniques were most effective and adaptable to Arkansas habitats and conditions. One primary concern in the testing and evaluation of various control measures was to find not only practical and efficient methods but how to get these measures utilized.

There are today many control measures and techniques known for checking depreddating animal populations, but the true test in this situation was to propose methods that the Arkansas farmer and landowner could and would utilize. The success or failure of the program was directly dependent on its being accepted and used by an individual to solve his own problem. As anyone concerned with animal control programs is well aware, everyone with an animal problem wants to blame his problem on someone else; he wants someone else to take care of this problem; and he is extremely reluctant to attempt to handle this problem himself. Therefore, the muskrat control program in Arkansas was not unique; but it did have some specific reasoning behind it which could be examined.

1. The farmer or some of his employees are in the rice field or on the levees almost daily. Through an educational program, they can become aware of what kind of damage or signs to look for, thus putting control measures into action as soon as evidence is observed. This will prevent large population buildups and consequent serious depredation.
2. Regardless of your efforts at making people aware of the effectiveness of any control program, especially one in which the individual must carry out the control measures himself, the word-of-mouth transfer is invaluable. Most often the farmer or landowner can better persuade his neighbors to control their muskrats, thus effecting a better community-type program.
3. They can better evaluate the success or failure of their own efforts in utilizing the suggested control measures.
4. The landowner or his labor force learns to effectively utilize trapping, toxic baits or other control techniques which he can pass on to others.
5. Once the individual recognizes that he can achieve control if the methods and techniques are effective, he will have only himself to blame if he doesn't achieve the level of control hoped for. He will also be more receptive to new control measures later provided.

With these prerequisites in mind and following two full months of daily field tests and evaluations of each feasible method and technique of muskrat control known at that time, the list of control measures was narrowed because of the urgency of the situation to those which had proven effective, practical, and would not endanger animals other than the target species.

The methods and techniques decided upon were:

1. Anticoagulant grain baits during winter months and zinc phosphide vegetable baits for summer.
2. Trapping.
3. Reduction or alteration of habitat.

In some cases involving small farm pond damage or areas where the use of toxicants or trapping might be prohibitive, mechanical barriers, such as fencing, were recommended as generally these situations provided small chance of population increase because of habitat restrictions.

During the first year of this program, the idea of stressing winter control was well substantiated by the following facts: (A) Muskrats leave rice fields either just before

or just after harvest unless the field is reflooded. On leaving rice fields they move back into their overwintering habitat. (B) They are then concentrated in ditches, canals, reservoirs, streams, etc. (C) Their natural food supply is shortest during winter months. (D) They are actively searching for food and are most likely to readily accept toxic baits presented during winter months. (E) Although they can and will reproduce almost year around, the peak reproductive periods in Arkansas are November-December and March-April. (F) Arkansas farmers and landowners will most nearly institute control programs during winter months when they have more time to devote to this type of work.

## CONTROL MEASURES

### Toxic Baiting

Although a number of toxicants were utilized in cage and field trials, the ones decided upon were chosen because of several reasons, including acceptance, safety to man, species selectivity, ease of preparation, equipment needed, costs, and effectiveness.

The idea for use of anticoagulant grain baits was obtained from Talbert (1967) and from methods proposed by Talbert (1958) for use on muskrats in California. They were, however, adapted to availability of grain, preference by muskrats, and practicality for Arkansas farmers. The methods of bait presentation, such as the floating bait box Talbert found effective in California, proved to be poorly accepted in Arkansas, not significantly by muskrats but by farmers. The anticoagulant "lollipops," a paraffinized grain bait made by incorporating liquid paraffin to the grain-anticoagulant bait mixture and adding a stick to provide for proper bait placement, were well accepted both by muskrats and by farmers. Presently, it is widely recognized that some commensal rodents are becoming resistant to anticoagulants, however, no evidence of resistance has been demonstrated by muskrats to the anticoagulant utilized in the control program in Arkansas. The anticoagulant Pival<sup>®</sup>, Pivalyl-1, Indandione, was found to be best accepted in the bait trials, and at a ratio of 1:16 with 0.5 percent concentrate proved the most effective and practical ratio tested. Not having sufficient time, funds, nor facilities to do research, this formulation was not subjected to extensive examination concerning why it proved most effective.

"Lollipops," made from a mixture of ten pounds of rolled oats, six pounds of paraffin, and one pound of (0.5 percent) Pival were easily made; and these baits were better accepted by farmers and landowners for muskrat control in Arkansas than any other toxic baiting method. The principal reason for this is that they were generally found to be easier to distribute along rice canals, reservoir banks, and other overwintering muskrat habitat; and proper bait placement was simpler than with the floating bait box.

Although zinc phosphide has been widely used for field rodents for many years and is quite effective on muskrats, to insure any adequate control in Arkansas rice fields, it is necessary to prebait. It is, however, easily utilized on vegetable baits which muskrats accept much better in summer than anticoagulant grain baits. Field tests in Arkansas rice fields demonstrated that bait acceptance is approximately equal with apples, carrots, or sweet potatoes treated with zinc phosphide. Recommendations for use of zinc phosphide are for summer baiting in rice fields with either carrots or sweet potatoes, and prebaiting at least three days to increase toxic acceptance. Recommendations for use of zinc phosphide stress the precautions for safety in handling and mixing, as well as the danger to non-target species. In result trials and evaluations, it has been found that trapping is a more effective, efficient, and practical method of control in the growing rice field than any single toxic baiting method or combination of two or more methods if the individual is reasonably skilled in trapping and has sufficient traps.

### Trapping

Although as Fitzwater (1970) stated, trapping is an extremely old profession and trappers for fur and farmers for control had long utilized steel traps for muskrats, few, if any, had much experience with any type of trap except long spring-types. The conibear-type trap was utilized in comparison tests, along with long spring steel traps, box traps, barrel traps, and wing-cage traps in canals, rice fields, reservoirs, and other muskrat habitat. The conibear-type trap proved to be superior to all other traps for catching muskrats. An adaptation of the old "stove pipe" trap proved especially effective in reservoirs, fish ponds, and farm ponds; however, it was not available commercially and had to be made individually as well as being difficult to transport and set. The conibear-type is not only extremely effective in deep or shallow water, but it is easy to carry a dozen

or more, simple to set, allows no escapes, is humane, is commercially available, and requires only one simple stake to hold it in place; therefore, no additional equipment is needed except a pocket knife.

As Becker (1972) mentioned, it is the general opinion that the use of traps alone could not solve the muskrat problem; however, after evaluating the program in Arkansas, it was proven to be one of the most effective methods of control. There are in fact some situations in Arkansas where efficient trapping is the only method which is both practical and effective. Any rice farmer familiar with using the conibear-type trap size 110 will attest to its being the most efficient year-round killer of muskrats presently available. There is also a psychological advantage associated with effective trapping methods. With toxic baits, and especially with anticoagulants, only a small percentage of the animals killed are observed; but where trapping is supplementary to a baiting program the individual can see evidence almost daily that he is effecting some control. This will help encourage him to continue a baiting program long enough to be effective.

#### Damage Prevention and Habitat Alteration

Although damage prevention can be effected, such as metal fence barriers or riprapping with stone or wood, this type of damage prevention is usually extremely costly and only semi-permanent because if the muskrat habitat is sufficient to encourage infestations it is simply a matter of time until an opening will become available. There is considerable evidence to support the fact that wider levees and dams are much less susceptible to damage caused by muskrats; but on existing structures, this is expensive and still will not prevent muskrats denning in them.

The most effective method of damage prevention other than population control is habitat alteration. It is recognized that habitat modification or alteration may, as stated by Howard (1967), affect the species composition and density of all other kinds of vertebrates and invertebrates living in that ecosystem. In the case of reducing aquatic vegetation, thus food supply and cover for muskrats in food fish and bait fish reservoirs, the owner may also be benefiting his fish production and harvesting while virtually eliminating muskrat damage. Therefore, in weighing the alternatives, this habitat modification or alteration may widely benefit the owner and prevent population buildup of overwintering muskrats. The elimination of cattails around farm ponds has in some cases virtually eliminated muskrat populations when other foods were non-existent. The elimination of unneeded water in rice canals during winter months has certainly helped in eliminating overwintering muskrat habitat. It is realized, of course, that this eliminates homes for other fur bearers, such as mink, Mustela vison; beaver, Castor canadensis; and nutria, Myocastor coypus. However, as is widely recognized, two of the species mentioned cause extensive damage themselves. Thus habitat alteration is one of the key recommendations in affecting a muskrat control program in Arkansas.

#### RESULTS AND DISCUSSION

The initial effort at establishing an educational program and getting the control methods to the farmers and landowners had been established in deciding to propose only methods and techniques they could utilize. The next step was to select one county as a pilot program. Lonoke County in Eastcentral Arkansas was chosen because of its large rice and fish farming acreage and its high muskrat populations. A county Extension meeting was held where control information was presented by discussion and the use of visual aids. Questions were encouraged from the audience and were asked of the audience by Extension personnel. Interest was high, and the farmers, although still wanting someone to do it for them, appeared to be willing to try the new methods.

Throughout the following year, county meetings were held in all counties with serious muskrat depredation. In some counties few, if any, of the farmers gave the control methods a try; whereas, in others some of the more industrious farmers or those really facing damage, conscientiously worked at muskrat control. During the following rice growing season, field demonstrations were carried out in farm leaders' fields or reservoirs. These groups ranged in size from six to 75 or more farmers, and they were taught how to mix bait, where and how to pick bait placement sites, and where and how to set traps. The field demonstrations proved to be much more valuable than the organized, rather formal county meetings; and, therefore, were widely utilized throughout the remainder of the program.

Magazine articles, newspapers, farm publications, Extension leaflets and publications, and radio and television provided methods of presenting the program to encourage interest.

Progress in achieving the goal of muskrat control required about two years of intensive effort before farmers and landowners decided they could not spray something on with an airplane or get someone else to do it for them and that muskrat control was necessary. Arkansas farmers and landowners, through an educational program, can now efficiently handle their own muskrat problems.

Success in this program can generally be attributed to three facts:

1. Proposal of effective, practical methods adapted to Arkansas' needs.
2. Farmer awareness through county Extension personnel, interested farm organizations, and public education efforts.
3. Field demonstrations which proved the farmer could adequately carry out his own muskrat control program.

#### SUMMARY

The results of this Extension educational muskrat control program should not be construed to mean that Arkansas rice and fish farmers and other landowners no longer have muskrat problems. However, they are aware that assistance is available, that each individual can alleviate damage by proper utilization of the methods outlined, that this information is available as near as his local county Extension agent's office, and that any new methods or techniques which can be effectively utilized will be provided to them when they become feasible.

In evaluation of the muskrat control program, county Extension agents in Arkansas conducted surveys in 1969-1970 to obtain estimates of muskrat damage. Total damage attributable to muskrat depredation dropped from \$892,455 in 1967 to less than \$20,000 in 1969-1970, statewide. In one county where extensive muskrat control programs were conducted, damage dropped from a high of \$400,000 in 1967 to less than \$2,000 by 1969. For the last three years less than six complaints have been received and most of these were handled by the local county Extension personnel. Hopefully, this program will continue to remain operative because any animal possessing the reproductive potential of the muskrat, once control measures are relaxed, is very capable of causing tremendous damage.

#### LITERATURE CITED

- BECKER, KURT. 1972. Muskrats in Central Europe and their control. Proc. Fifth Vertebrate Pest Conference (Fresno, California). pp. 18-21.
- FITZWATER, WILLIAM D. 1970. Trapping - the oldest profession. Proc. Fourth Vertebrate Pest Conference (West Sacramento, California). pp. 101-108.
- HOWARD, WALTER E. 1967. Biological control of vertebrate pests. Proc. Third Vertebrate Pest Conference (San Francisco, California). pp. 137-157.
- SNEAD, I. E. 1950. A family type live trap, handling cage, and associated techniques for muskrats. J. Wildl. Manage. 14:67-69.
- TALBERT, ROLLO E. 1958. California State Department of Agriculture Rodent Circular 126. Reprint.
- \_\_\_\_\_. 1967. Personal Communication.