February 1962

# Controlling Muskrats

Rollo E. Talbert
*District Supervisor, Weed and Vertebrate Pest Control, California Department of Agriculture*

# CONTROLLING MUSKRATS

Rollo E. Talbert
District Supervisor, Weed and Vertebrate Pest Control
California Department of Agriculture

The muskrat in California was originally native to the general area of the Colorado River in Imperial Valley and a portion of the easterly State line from central Mono County to central eastern Lassen County. The two areas were inhabited by the Colorado River Muskrat Ondatra zibethica bernardi in Imperial Valley and the Nevada Muskrat Ondatra zibethica mergens in the northeasterly portion of the State.

Muskrats are now found throughout most of the State with the San Joaquin Valley being the most recent to show a large and general distribution. As to the value of the muskrat as a fur bearer, it has been for many years the most important in California; however, the total value of all fur bearers taken in any one year has seldom exceeded $100,000, with the muskrat producing approximately 80 percent of this amount.

Today damage attributed to muskrat activities occurs both to irrigation systems and waterways serving agricultural interests as well as to power company installations, waterfowl refuges and hunting clubs. Direct damage or destruction of agricultural crops is relatively minor although the muskrat is known to feed on a variety of produce including ear corn, alfalfa, clover and carrots and frequently will cut a rather wide swath of rice near water control boxes separating rice paddies. The brief activities of fur trappers appear to have little significance as applied to alleviating these losses, so we are forced to recognize that we will have to live with the muskrat but control its activities when necessary. When speaking of control of muskrats we usually think in

terms of damage prevention as well as taking or killing the animal so the methods described will be mentioned in that order.

DAMAGE PREVENTION. Beginning with irrigation ditches and waterways, those constructed with wide bases sloping gradually at a 1′ to 3' inner pitch and a 1′ to 2′ outer pitch with a minimum base of 20′ at water level have been found to withstand burrowing without breakthrough. A minimum height of three feet above water level provides nesting area without damage. Use of a spillway preventing a water rise of more than 6 inches is advisable to prevent renewed upward burrowing as the water level increases. 1/ A core of crushed rock would be a costly but valuable aid; however, this would be more useful where smaller levees are used as permanent structures.

To protect head gates from burrowing at the base or sides, wings of concrete or galvanized iron collars are effective. These should extend laterally at least ten (10) feet in each direction and downward at least two (2) to four (4) feet depending on height of the outlet above water. Where crossovers occur both upper and lower ditches are particularly vulnerable to muskrat burrowing. Concrete should be used to line the ditches for a minimum of 15 feet in each direction. To assure permanence of this construction the ditch facing should be at least four inches thick.

It is timely to mention that concrete construction is considerably improved if very lengthy by use of reinforcing iron or galvanized mesh wire. There have been instances in which muskrats have burrowed through cracks or crumbled sections and caused a break before their activities were noticed.

When protection of small levees and ditches is desired, two inch

diamond mesh 14 gauge wire which has been galvanized after weaving may be used. The wire can be embedded shallowly in the bank or pegged to the surface and should extend vertically two feet above and below water level. 2/

In the Sacramento Valley some rice growers have built larger checkers for wider (6 feet at the base) and slightly higher levee construction, thereby largely eliminating breaks as the large levees permit close inspection and make it possible to trap or shoot muskrats soon after they enter the field. Rice boxes can be protected by a wing construction, both laterally and below the box. These extend centrally into the soil.

REPELLENT MATERIALS. Crankcase drainings have been used effectively as a deterrent to burrowing. Application is made by probing one inch holes into ditchbanks six inches above water line to a depth of one foot or more. These should be placed laterally about four inches apart for a distance of 15 feet on either side of the area to be protected. After the holes are filled with oil to within three inches of the opening, they should then be capped with soil. 3/

Suggestions are offered by the United States Fish and Wildlife Service concerning calcium carbide, naphthalene flakes or moth balls. These chemicals are placed in holes two to four feet apart for the entire length of an embankment to a depth of one and one-half to two feet below water level and about two feet back from the edge of the water. Four or five ounces of the chemical are placed in each hole which is then plugged with dirt and tamped tightly so that the gases will penetrate the soil, 4/

HABITAT CONTROL. Reduction or total elimination of weed growth in

irrigation canals and ditches should be given serious consideration as a further means of damage prevention. This is of little value when adjacent to pastures or when nearby ponds or swampy areas could provide a continuous supply of food. The greatest benefit would result from weed free canals and ditches of some length with little or no favored habitat readily accessible.

REDUCTION OF MUSKRAT POPULATION. Reduction of muskrats should be considered as a means of assisting the objective of damage prevention. The most widely used method is that of trapping. No. 1, and occasionally No. 0, steel traps of several kinds are used with variations in the method of placement to fit the immediate needs. Traps may be placed two on a float with some preferred bait fastened between them singly or in burrow entrances submerged to six or seven inches on inclining runways or just under the water if the entrance is shallow. Bank sets can be made where irregular but nearly vertical sides occur by placing the trap on a small artificial or natural shelf. This set may be baited or unbaited. If bait is used, it may be placed as a lure above and slightly behind the set. Bait sets on slanting boards all under water through holes in ice are used also. In all of these sets the traps are so staked and attached that the muskrat is drowned by the weight of the traps and chain or otherwise entangled under water. There are other types of traps designed to prevent escape of the animal by a device that pushes the head back so that the imprisoned foot cannot be gnawed off; still others are designed to catch the animal high on the shoulder.

BARREL TRAPS. Fifty gallon steel drums with sides perforated from the base to the center with the tops cut out and replaced with a plastic cover slit across the center have been used effectively in the San

Joaquin Valley. The barrel is weighted with rocks and submerged so that eight or ten inches extend above the water level. An inclining board from the water or one placed from the bank provides access to the top. Muskrats lose their footing and slip through the slit area and are then drowned. This should be regarded as a permanent installation for stable water levels only. Pontoons can be bolted to the sides and the weight balanced by addition of rocks so that the barrel will be stable under conditions of water fluctuation. When using the floating barrel an anchor will be needed to prevent the barrel from drifting away.

FUNNEL TRAPS. Traps constructed of close mesh galvanized wire four feet long by 18 inches in diameter and permitting entry through a restricted funnel entrance at either end will take a considerable number of muskrats. These traps should be placed near an embankment as muskrats usually travel either side of narrow channels or streams. Floats may be attached to the sides of the trap to hold the level constant with water fluctuation or stakes may be used to fix their position in the water where there is little change of level. They need not be completely submersed. A screen of galvanized wire is used as a guide and is extended six inches above water level to several feet below. A diving bar also is placed out from the outer rim of the trap which causes the muskrat to pass under the obstruction and enter the funnel* Drawbacks to this method were encountered due to bulkiness and difficulty in making placements; also, turtles, frogs and fish are taken.

A similar trap used in Belgium has a single entrance and vertical bars on the opposite end so spaced that smaller fish may escape.

FUMIGANTS. In the San Joaquin Valley control has been accomplished with the use of carbon bisulphide. When water is drained from, the canals in the fall, burrows are exposed and can be treated using either the Demon Rodent Gun or waste balls» In either case the material should be fired after a few minutes and holes and leaks securely plugged, to prevent escape of the gases. The dosage rate per burrow should be at least two or three saturated waste balls or approximately two or three strokes of the plunger when using the Demon Rodent Gun. If it should be determined that the dosage level is not adequate, the rate should be increased. Treatment should be made as soon as possible following draining of the canals. This procedure has also been used to control muskrats in reservoirs. 5/

SHOOTING. Although largely nocturnal, muskrats are often seen in the daytime and can be shot as they are discovered by ditch tenders or farmers checking their ditches or crops. In areas of low muskrat populations, each animal so disposed of is one less to cause trouble later.

TOXIC BAIT FOR THE CONTROL OF MUSKRATS. Control of muskrats using toxic baits has been attempted at times, possibly without outstanding results as there has been very little information available. In response to requests by county agricultural commissioners asking for other means of removing muskrats from trouble spots, the California Department of Agriculture cooperating with personnel of the University of California at Davis began an investigational program more than ten years ago. After several years of seasonal work involving food trials and several poisons, anticoagulants applied to rolled barley and exposed in floating boxes were found to be an effective control procedure.

Untreated food preference trials included rolled barley, whole barley, wheat, oats and oat grits, apples, pears, fresh corn, sugar beets, carrots, bananas, cabbage and lettuce. Of the cereals, rolled barley was preferred in the Sacramento Valley; however, oat grits is a satisfactory material in the Imperial Valley. Of the fruit and vegetable offerings, only cabbage and lettuce were refused.

For ease of preparation and low cost the cereal baits are preferred. Trials using strychnine alkaloid, zinc phosphide, thallium sulfate and sodium fluoroacetate although not extensive were not encouraging. Obvious objections arise due to secondary poisoning possibilities resulting from thallium sulfate or 1080 killed animals in addition to restrictions as to use of these materials to official agencies only. It was found that the time required for prebaiting with untreated material could be used with greater effectiveness by exposing anticoagulant treated bait at the beginning.

Some muskrats begin to visit the boxes immediately while others may wait or ignore them for several days to a week or more. Once the visiting habit is established, however, their use of them becomes routine with many making it the first point of call before dusk.

Experimental work conducted in the Sacramento Valley during August, September and October was often hampered by muskrats bringing green or rotting vegetation into the boxes. It was later learned, during experimental work in May, June and July, that very little material was deposited in the boxes. This, of course, points up the desirability of waterproofing baits and the University of California at Davis is again cooperating with the State Department of Agriculture to find the most effective way to do this and to improve other methods now under

consideration. In southern California the Colorado muskrat does not often deposit unwanted material in bait boxes and has presented no problem in this respect.

The effectiveness of the floating bait box - anticoagulant method of muskrat control is indicated in a report from the Imperial Irrigation District in Imperial Valley which has 600 boxes in operation and estimates a 75 per cent muskrat reduction since beginning this program several years ago. This district has modified the original heavy wooden box and float described in the California State Department of Agriculture Rodent Circular No. 126 to me of very light weight. Floats are now made of a twenty-four inch square of one and one-half inch thick Styrafoam to which is cemented an eighteen by eighteen inch square of quarter inch plywood. The box, also eighteen inches by eighteen inches and eight Inches deep, is inverted and hinged at the base and has four entrance holes, roughly four Inches by four Inches, although muskrats freely enter boxes having one or two openings. One pound coffee cans are used as bait containers and the supply must be maintained to be effective. Although other levels were used a standard of one pound of anticoagulant to sixteen pounds of bait material is now recommended. The bait box provides a high degree of selectivity, can be serviced quickly and can be used in almost any circumstance. We think the floating bait box technique developed here in California may eventually become widely used as this method becomes known.

1/, 4/ Indiana Department of Conservation Research Report Muskrat Damage - Prevention and Control Division of Fish and Fame July 1959

2/, 3, 5/ California State Department of Agriculture Rodent Circular 126 August 29, 1958

# CONTROL OP NUTRIA

Rollo E. Talbert
District Supervisor, Weed and Vertebrate Pest Control
California Department of Agriculture

Within the past ten years California in common with many other states has experienced a nutria boom which has resulted in the establishing of several hundred nutria ranches. Although we now have legalized restrictions covering holding pens, escapes have occurred both since and prior to the applied restrictions. The first known escape involved an unknown number of animals in Stanislaus County several years prior to their discovery in 1948 • Experimental work was then conducted by Stanley E. Piper who was at that time district supervisor of rodent and weed control for the California Department of Agriculture. Mr. Piper attempted to develop control procedures utilizing toxic baits but difficulty in obtaining satisfactory control with carrots or sweet potatoes treated with either zinc phosphide or strychnine alkaloid led to the use of steel traps as a means of taking the animals. A trapping program was begun in 1951 under the supervision of Frank Barmettler, assistant district agent for the Bureau of Sport Fisheries and Wildlife, United States Fish and Wildlife Service. The procedure used by Mr. Barmettler is as follows:

TRAPPING. No. 3 steel traps may be placed an inch or two under water at the shallow edge of feeding areas that are in regular use. Sets may also be placed at the burrow entrances and in runs made in the banks of canals or ponds. Rafts composed of tules, cattails and other material may be found where nutria are well established. As these are used for both feeding and resting, traps placed on the lower parts or just under water are very effective. Bait is not required as a lure and

traps need not be hidden or disguised as nutria do not seem to recognize traps as a foreign object or dangerous to them. Trap awareness does not seem to develop even with animals that have been caught and escaped as they are usually soon caught again. Traps must be staked or fastened so that the animals may be quickly retrieved.

SHOOTING. Nutria have been taken by shooting at feeding grounds at night, thereby quickly disposing of part of the population. There have been instances in which a number of nutria were discovered in the daytime huddled together, as is their habit in captivity, which implied that they had been very recently released. Shooting was most effective here as the animals made little or no attempt to scatter or seek cover.