Controlling Beaver in the Gulf Coastal Plain

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Abstract: From December 1979 to May 1983, beaver (*Castor canadensis*) control trapping was conducted in 50 impoundments in the Gulf Coastal Plain of Alabama, Mississippi, and Louisiana. About 76% of impoundments contained beaver at some time within 3 years following initial heavy trapping. Age structure of beaver from impoundments trapped for 4 successive years did not differ significantly from that of the first year. Repopulation of drained impoundments appears to be enhanced by flooding. Many beaver problems are associated with manmade levees, railroads, and other roadbeds. Site-specific beaver control appears to require sustained followup trapping in regions well populated by beaver.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 38:189-196

Beaver were nearly extirpated from North America by 1850. However, during the 1930s and 1940s many state wildlife agencies stocked former range. By the mid-1960s, beaver populations in the southeastern United States had increased to nuisance levels in some areas and were responsible for millions of dollars worth of damage to merchantable timber and crops (Arner et al. 1969, Anon. 1973, Goodbee and Price 1975, Woodward et al. 1976). Furthermore, by 1976, the acreage impounded in Mississippi had increased to about 3 times the level of 1966 (Dubose 1978). The total economic loss was estimated at about $22.5 million or about $2.5 million annually to Mississippi's economy (Dubose 1978). Beaver also seriously damage roadbeds of highways and railroads and pond levees. However, beaver also impound water, increasing forest habitat diversity for wildlife and fish.

There is an obvious need for site-specific control of beaver populations without extirpation from vast areas. Commercial trapping has not provided satisfactory control. The purpose of this research was to determine whether removal of nuisance populations from specific problem areas would provide acceptable control. Further, the authors wished to document the rate at which trapped-out areas were repopulated.

The authors thank E. P. Hill, R. C. Chabreck, and R. J. Muncy for reviewing drafts of the manuscript. G. Houston, G. L. Holder, and J. W. Bradford assisted with trapping and data collection.

Methods

From December 1979 to May 1983, control trapping was conducted at 50 locations. There were 14, 33, and 3 locations in Mississippi, Alabama, and Louisiana, respectively. The 3 locations trapped in Louisiana and 12 of the Alabama locations were in the Lower Gulf Coastal Plain. The 35 other locations were in the Upper Gulf Coastal Plain. All locations trapped had existing beaver impoundments and were in bottomland hardwood or mixed pine-hardwood forest habitat.

Specific impoundments were selected along the Burlington-Northern Railroad (BNRR) between Amory, Mississippi, and Pensacola, Florida, (Pensacola sub) to the Florida state line, and from York to Mobile, Alabama (Mobile sub). All beaver impoundments which were causing water drainage problems along the BNRR were trapped without regard for impoundment size or level of timber damage. It was believed this transect provided a reasonable number of impoundments representing the average beaver impoundment. The 3 Louisiana impoundments were on private land having mixed pine-hardwood forest habitat near Clinton.

Prior to trapping, the size of each impoundment was visually estimated to the nearest 0.1 ha and beaver dams were broken by hand or with explosives to lower water levels and expose flooded beaver runs. Trapping was initiated at 26 impoundments during the 1979–80 winter, 20 during 1980 and 1981, and 4 during 1981 and 1982, so that data were obtained for 4, 3, and 2 years of trapping, respectively. A few (12) beavers were shot at night, but all others were taken with Conibear No. 330 or Northwoods No. 300 killer traps. Initially, 3 to 6 traps were set in small impoundments (1 to 2 ha) and 6 to 12 traps in larger impoundments. Traps were checked every 2 days until trap success fell below about 10% and then once per week during the first year of trapping for each impoundment. After each area was believed to have been trapped out, explosives were used to open waterways to completely drain impoundments. Then trapping was continued at each location (1 to 3 traps), and traps were checked at about 2-week intervals year long throughout the study to capture immigrants. Lower jaws were saved for estimating ages according to Van Nostrand and Stephenson (1964).

Chi-square analyses were used to evaluate changes in beaver population age distribution, and correlation procedures were used to examine the association between size of impoundments and number of beaver trapped (Snedecor and Cochran 1973). Statistical significance was accepted at the 0.05 level.

Results

Population Control

During initial trapping efforts, 370 beaver were taken from 50 impoundments (Table 1). During the second year of trapping, 124 beaver were taken from 40% of the 50 impoundments, and 91 were taken from 24% ($N = 46$) the third year. By the fourth year of trapping, 48 beaver were taken from 54% of the original 26 trapped impoundments. Three of the first 26 impoundments contained beaver during all 4 years of trapping. Considering individual impoundments, 76% contained beaver at some time after the initial year of trapping.

Population Density

Based on first year removal of resident beaver, population densities ranged from 0.38/ha to 12.5/ha; mean beaver density was about 1.7 per ha. Estimates of density are based on harvest per area impounded by water and do not include dry land habitat. The data are intended for use in comparisons and should not be used as estimates of beaver density over large areas. However, these estimates are probably lower than actual densities in impoundments because all residents may not have been removed during the first year of trapping. Some may have moved to other areas following drainage. In addition, a few of the traps used in this study which might have contained beaver were stolen.

As trapping progressed, there was a general decline in the number of beaver trapped per year from occupied impoundments. The proportion of adults was initially 56%, and fell to 38% the second year. However, the proportion of adults was 51% and 44% for the third and fourth years, respectively (Table 2). Age structure was not significantly different between years.

The total number of beaver trapped from any location was significantly related to size of the impoundment ($r = 0.69$, $t = 3.3$). In general, the most beaver were trapped from the largest impoundments; and these impoundments were repopulated within 1 year after being trapped out and drained.

Table 1. Number of beaver trapped from impoundments in the Gulf Coastal Plain from December 1979 to May 1983.

Successive years[a]	*N* impoundments trapped	*N* impoundments occupied *N*	*N* impoundments occupied %	*N* beaver
1	50	50	100	370
2	50	20	40	124
3	46	11	24	91
4	26	14	54	48

[a] Of the 50 impoundments, 26 were trapped initially while 20 and 4 additional impoundments were added in the second and third years of the study, respectively.

Table 2. Age structure of beaver taken in the Gulf Coastal Plain during successive years of trapping the same locations. Data are percent in each age class.

	Year			
Age class	1 *N* = 370	2 124	3 91	4 48
≥3.5	56	38	51	44
2.5	21	36	31	35
1.5	14	17	13	17
Kits	9	9	5	4

Non-target Animals

During the 4 years of trapping (41,191 trap nights) a number of other animals were also captured including 86 common snapping turtles (*Chelydra sepentina*), 10 raccoons (*Procyon lotor*), 1 dog (*Canis familiaris*), 3 muskrats (*Odonatra ziebiethica*), 11 river otters (*Lutra canadensis*), 1 wood duck (*Aix sponsa*), 1 black vulture (*Coragyps atratus*), and 2 alligators (*Alligator mississippiensis*). There was 1 non-target capture per 358 trap nights. The dog and black vulture were captured by traps that had become exposed following water drainage. Alligators were captured when weather was warm. Turtles were captured predominantly during spring and summer, river otters during fall and winter, and captures of other non-target species were randomly distributed throughout the year.

Discussion

Low areas in the Southeast are frequently flooded by high water during winter and spring. Unusual flooding occurred during the last 2 years of the study. During the second year of trapping, heavy flooding did not occur. The presence of large numbers of beavers in impoundments which had been trapped and drained and the failure of trapping to significantly change age structure suggest that flooding plays an important role in beaver dispersal and repopulation of trapped-out areas. Because other occupied habitat was within 1 km of most of the impoundments trapped, it is speculated that beaver captured in years following trapping out were expanding their ranges from adjacent habitat. If other populations had been simultaneously trapped in the vicinity of this study's impoundments, control may have been achieved sooner. Further research is needed to test this hypothesis. However, the management implication is that beaver control in areas subject to periodic flooding and near other occupied habitat requires constant vigilance.

Serious questions arise concerning the costs and benefits of beaver control and many beaver problems seem to be rooted in long-term neglect. Dubose (1978) reported that the average beaver impoundment had existed for 9 years.

The data from this study suggest that once control is established, water drainage can be maintained but only with periodic trapping to remove immigrants. Leege (1968) also reported that additional beaver moved into trapped out problem areas in Idaho each spring and had to be removed. In this study, continuous trapping was required to eliminate damage caused by beaver. Total control over large areas will probably be needed to eliminate nuisance beaver.

Effort for Control

The effort needed to control beaver is very difficult to assess. Wigley (1981) estimated that setting and checking traps required 0.5 and 0.2 hour per trap, respectively. These estimates seem accurate from the experience in this study but do not include travel between impoundments. In this study, one person initially traveled to and set traps (5 to 10 traps per impoundment) in 5 to 6 impoundments per day (10 to 16 hours). Thereafter, traps in 20 to 25 impoundments were checked in 1 day when they were distributed over a 300 km route, and walking distance to each impoundment averaged about 0.5 km. Additional time was needed for improving water drainage. However, it is not recommended that a person work alone in remote areas due to the possibilities of snake bite and hazardous water conditions.

The cost of trapping equipment is a further consideration. During the past 4 years, the price of killer traps for beaver has ranged from about $7 to $22 each; and the price of setting tongs has ranged from about $2 to $7 each. At present, traps and tongs can be purchased for about $10 and $3, respectively (not a government rate). However, catalog prices are much higher. Some traps were lost due to flooding, some wore out, and some were stolen. The present need for replacement traps is about 10% per year in this study.

Most states permit control trapping during closed seasons for nuisance animal control. Laws generally require traps to be checked daily to maximize humane aspects of trapping and to minimize waste of natural resources. There should be few inhumane kills if killer traps are used.

Daily checking of beaver traps would substantially increase costs of a control operation unless beaver pelt values were high enough to offset the extra labor costs. Pelt prices during the study ranged from about $2 to $8. The daily cost (16-hour day, $100 per man, 300 miles travel, $45 per diem/man) of labor and travel for the trapping effort in this study was about $350 for a 2-man crew. The daily cost for a 1-man crew would have been about $215. To offset the extra costs of checking traps daily, about 54 to 108 captures per day would have been needed. This harvest rate could not have been achieved every day.

In addition, carrying 15 kg to 30 kg of beaver, or even skins, back to a vehicle was impractical. Too much effort would have been required for skinning and transporting pelts. At least 10 minutes is needed for skinning each beaver. The extra time needed to skin 50 animals would have been at least 8 to 9 man hours. Assuming that 2 men worked each impoundment and a day's catch averaged 5 beaver per impoundment, the skinning alone would require at least 30 minutes per impoundment. Therefore, only about 10 impoundments could be trapped per day, rather than the 20–25 that were averaged in this study; and to break even, the average pelt price would have to be at least $7.

Although pelt prices might have paid for an extra trapping crew, this would only be feasible during the legal trapping season when fur is prime and if enough beaver could be captured. Further, pelt prices could not have paid for initial trap setting, periodic checking of trapped-out impoundments, or the labor expended for water drainage.

As long as prices for beaver pelts remain low, control efforts will be most efficient if the animals killed are left at the kill sites and traps are checked periodically. This allows the greatest number of problem areas to be worked on for the least cost.

Non-target Animals

In general, the frequency of capture for non-target species was very low. Data support the contention that beaver trapping with killer traps in water sets is highly selective. However, after draining impoundments, migrations of numerous turtles and snakes were witnessed. Obviously, conversion of impounded areas to dry land eliminates species that require wetland habitat. This trade-off should be considered in any beaver management decision. Beaver activities increase diversity of plant and animal communities that would not otherwise exist. On the other hand, some situations require control of nuisance beaver populations. The loss of some aquatic habitat and some non-target individuals cannot be completely avoided if controls of beaver damage and water drainage are necessary. Careful placement of killer traps so that the top jaw is under water will minimize accidental captures of non-target species.

Observations

It was obvious that impoundment of water by beaver was significantly enhanced by the presence of railroad, highway, and other roadbeds which impeded natural water drainage. Many of these roadbeds were established more than 100 years ago when beaver populations essentially did not exist. Drainage pipes under the roadbeds are generally not large enough to keep water from backing up and many have silted in. It is relatively easy for beaver to impound water over large areas when most of the dam building has already been done by railroads, highway departments, and forest landowners. Further, borrow pits parallel both sides of most roadbeds; and many of these are always filled with water, providing a great deal of manmade beaver habitat. Based on 5 years of examining numerous beaver problems in addition to those reported here, the authors have noted that problem beaver impoundments in the Southeast are usually associated with roadbeds or some type of manmade levee. In some areas, careful planning for drainage under new roads and improvement of drainage under existing roadbeds will reduce the problems attributed to beaver.

Conclusions

Beaver control may be effectively achieved in some areas with 1 season of intensive trapping and water drainage. However, in areas of the Gulf Coastal Plain where beaver populations have been uncontrolled for many years, conversion of individual impoundments to dry land may require several years of trapping and maintenance of water drainage. Beaver control is more difficult to achieve in areas near other occupied habitat, especially if the areas are subject to periodic flooding. However, to conserve natural diversity and wildlife resources, beaver populations should be controlled without large scale extermination. Individual impoundments were trapped along a transect, and each impoundment was subject to repopulation from other beaver colonies in the vicinity. Control of beaver for a large block of forested land would require less frequent followups. Travel time would be reduced so that more impoundments could be trapped per unit of time. After establishing control, a 2-man crew should be able to handle trapping in at least 150 different impoundments, assuming that traps are checked at 2-week intervals. The crew could also monitor other areas for newly-established colonies. A 2-man crew is presently controling beaver damage in more than 100 impoundments distributed from Memphis, Tennessee, to Mobile, Alabama, and from Macon, Georgia, to Birmingham, Alabama. Although not part of a formal study, this information provides some insight as to the potential forest protection that could be achieved by a 2-man crew. A forest could be efficiently protected from repopulation by trapping drainages on the boundary of the tract. Regardless, unless beaver were extirpated from the entire region, some continuous effort to maintain protection would be needed.

High density populations could be significantly reduced in problem areas if resident beaver were removed, water drainage maintained, and the area protected by periodic trapping, especially after flooding. The authors believe that beaver problems can be reduced by improving water drainage associated with manmade levees and roadbeds.

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