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Source: *The Journal of Wildlife Management*, Vol. 22, No. 2 (Apr., 1958), pp. 179-183

Published by: [Allen Press](#)

Stable URL: <http://www.jstor.org/stable/3797326>

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Received for publication November 12, 1957.

BEAVER-FOREST RELATIONSHIPS IN ST. TAMMANY PARISH, LOUISIANA¹

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Although much has been written about the ecology of beaver (*Castor canadensis*) in the northern and western United States, little has been published on the environmental relationships of this animal in the South. An investigation of beaver in St. Tammany Parish, Louisiana, in 1956 revealed differences in food and feeding habits as well as manner of living. This paper reports the results of the investigation with emphasis on the effects of beaver on the timber resources to which they had access.

Historical records indicate that beaver were common throughout much of Louisiana, but, as elsewhere, settlement of the state brought a drastic decline in the population,

so that in 1928 Arthur (1931) stated that they were restricted to a few colonies along the Amite River, where local residents prevented their extirpation. With rigid protection this remnant population increased and by 1938, according to Dahlen (1939), it was necessary to remove beaver in areas where agricultural damage became serious. Some of these live-trapped beaver were released in St. Tammany Parish in southeastern Louisiana.

This parish borders the northern shore of Lake Pontchartrain and has four characteristic plant and physiographic divisions: subdelta marshes, hardwood bottoms, flat piney woods, and pine hills. The subdelta marshes lie in the southeastern part of the parish, adjacent to Lake Pontchartrain and vary in width from one to two miles. The hardwood bottoms are located in the southwestern part of the parish along Lake Pontchartrain and in the floodplain of most streams. The flat piney woods cover a large portion of the

¹ The author is indebted to Leslie L. Glasgow, School of Forestry, Louisiana State University, for his help in setting up the study and in preparation of the manuscript. Special thanks are also extended to Bryant A. Bateman, Louisiana State University, for many helpful suggestions.

parish and are located on the prairie terrace, which is characterized by much clay near the surface and rather poor subsurface drainage. The pine hills are situated on a second terrace in the northwestern corner of the parish.

METHODS

Areas with heavy beaver cutting and a large number of trees and shrubs were selected for sampling to determine the use of woody plants by beaver. Sampling was done along 5 bayous on plots that were 0.5-chain deep and 4 or 5 chains in length. Within each plot, all woody plants 1 inch or larger in diameter (measured 4.5 feet from the ground) were tallied by species and diameter class. The cruise also included the tallying by diameter class and species of "felled plants," as well as those that were "barked." The term "barked" was used to indicate the trees on which beaver had gnawed but which remained standing.

The sample plots contained 38 woody species, with an average of 1,349 stems per acre. Of the species of woody plants that occurred on the sample plots, 22 species had been utilized by beaver. These 22 species were classified according to utilization and value to beaver (Table 1). Utilization ratings were expressed in percentages. As an example, if there were 200 stems of a particular plant species present and 50 of them had been cut or barked by beaver, the percentage of utilization for that species was 25. A similar calculation was made for each species and the results of all calculations were listed from highest to lowest. The species showing a high percentage of utilization were believed to be preferred by beaver. Although utilization ranking may indicate a preference shown by beaver, it is not believed to be a good index of the value of the species to the animals; therefore, calculations were made to determine the value of each species. This was accomplished by multiplying the percentage that each species made up of the total stand, by the percentage to which that species was utilized. The results of these calculations were then ranked from highest to lowest. By

this method, species making up a large portion of the stand but low in utilization received a rating that was approximately equivalent to species that had been utilized heavily but had comprised a small portion of the stand.

All plants used by beaver were then classified as high, medium, or low for both utilization and value on a basis of these calculations. For utilization, a plant species having more than 50 per cent of its total number utilized was listed as high, 10 per cent to 50 per cent medium, and less than 10 per cent low. In classifying the plants according to their value to beaver, all multiplications showing a product over 100 were listed as high, 20 to 100 medium, and less than 20 low.

OBSERVATIONS AND RESULTS

Beaver had cut or barked 42 per cent of these woody plants. As determined by analysis of variance, there seemed to be no selectivity by the animals for certain-sized diameter classes. Beaver had cut down 18 per cent of all woody stems present, of which over half were in the 1-inch class and none were over 5 inches in diameter. An additional 24 per cent of the woody plants 1 inch or more in diameter had been barked.

The most important species was loblolly pine, which made up 33 per cent of the plants on the sample plots and 58 per cent of the woody plants used by beaver. However, loblolly pine was preceded in utilization by sweetgum, southern sweetbay, and spruce pine, but these species combined made up only 12 per cent of the plants on the sample plots. Thigpen (1950) indicated that sweetgum, loblolly pine, and spruce pine were used heavily by beaver in St. Helena and East Feliciana parishes. Although silverbell was used very little in St. Tammany Parish, the writer observed areas in nearby parishes where silverbell made up a large portion of the beaver's diet. Casual observations throughout southeastern Louisiana and southern Mississippi indicate that spruce pine and sweetgum are cut heavily for food wherever beaver come in contact with them. Studies in the North-

TABLE 1.—WOODY PLANTS USED BY BEAVER IN ST. TAMMANY PARISH, LOUISIANA, 1956

Species ¹	Percentage of Plants Available	Percentage Utilized	Value Index	Utilization	Value
Loblolly pine <i>Pinus taeda</i>	32.7	71.7	2345	high	high
Sweetgum <i>Liquidambar styraciflua</i>	5.2	83.3	433	high	high
Spruce pine <i>Pinus glabra</i>	4.3	74.1	391	high	high
Southern sweetbay <i>Magnolia virginiana</i>	2.2	79.3	174	high	high
Tupelo gum <i>Nyssa aquatica</i>	2.6	54.5	142	high	high
Baldcypress <i>Taxodium distichum</i>	5.6	50.0	280	high	high
Bluebeech <i>Carpinus caroliniana</i>	1.3	66.7	87	high	medium
Buttonbush <i>Cephalanthus occidentalis</i>	4.5	22.8	103	medium	high
Water ash <i>Fraxinus caroliniana</i>	4.6	17.7	81	medium	medium
Southern red oak <i>Quercus falcata</i>	0.4	50.0	20	medium	medium
Black willow <i>Salix nigra</i>	1.1	20.0	22	medium	medium
Winged sumac <i>Rhus copallina</i>	0.4	50.0	20	medium	medium
Obtusa oak <i>Quercus obtusa</i>	1.5	30.0	45	medium	medium
Snowbell <i>Styrax</i> sp.	1.4	31.6	44	medium	medium
Cow oak <i>Quercus prinus</i>	0.7	20.0	14	medium	low
Mayhaw <i>Crataegus opaca</i>	0.2	50.0	10	medium	low
Waxmyrtle <i>Myrica cerifera</i>	8.0	8.2	66	low	medium
Black gum <i>Nyssa sylvatica</i>	5.4	2.7	15	low	low
Silverbell <i>Halesia diptera</i>	0.7	8.5	6	low	low
Water oak <i>Quercus nigra</i>	1.0	6.0	6	low	low
Titi <i>Cyrilla racemiflora</i>	2.2	3.4	7	low	low
Red maple <i>Acer rubrum</i>	1.7	4.3	7	low	low

¹ Plant nomenclature from Brown (1945).

ern and Western States have shown that, although beaver may cut pine for use in dam and lodge building, they do not normally use it for food (Seton, 1909:447-479; and Arthur, *op. cit.*).

Observations indicated that during the summer months beaver fed heavily on the roots and basal portions of herbaceous

plants. Rice cutgrass (*Leersia oryzoides*) seemed to be a favorite food. Sawgrass (*Cladium jamaicense*), white waterlily (*Castalia odorata*), bulltongue (*Sagittaria* sp.), cattail (*Typha* sp.), pickerel weed (*Pontederia cordata*), and giant bullwhip (*Scirpus californicus*) were also eaten. An analysis of several beaver droppings in June

disclosed the presence of many undigested white waterlily seeds. Thigpen (*op. cit.*) reported that golden club (*Orontium aquaticum*) was utilized heavily by beaver in St. Helena Parish.

Beaver colonies were observed on 11 bayous. Since most of the bayous contained permanent, deep water, dams were built at only 3 colonies. Bank burrows were used on most bayous, but lodges were built where high banks were absent or where deep flooding was frequent. One colony was found in a small marsh. Within this marsh a series of canals, two lodges, and a dam had been constructed. The dam was 1,391 feet long and built of mud and marsh plants, but contained practically no wood.

DISCUSSION

In most areas, fewer woody plants were felled than were barked. Since few dams or lodges were built, very little woody material was needed for construction. Streams in Louisiana do not freeze over; consequently there was no need for the storage of winter food. Southern beaver feed much more extensively on land than those in northern states. Many standing trees were observed from which beaver had removed in excess of 12 square feet of bark from the basal surface of the stem.

The actual felling of plants was of little significance to forestry, since only small, suppressed trees or shrubs were cut down. This amounted to nothing more than a light precommercial thinning in most areas. However, I consider the cutting of ornamental plants of any type about residential areas to be detrimental. Phares (1950) reported that 88 per cent of the hardwoods cut by beaver in southwestern Mississippi sprouted back with increased vigor.

Beaver barked 24 per cent of all woody plants one inch or larger in diameter. Whenever a beaver gnawed on a tree, the effort was seldom so persistent that the tree was girdled; consequently, few trees died as a result of bark removal. Beaver girdled less than 3 per cent of the trees and less than one-half of this number died. Evidently bark removal had very little effect on tree-

diameter growth. Increment borings on barked and comparable nonbarked loblolly pine trees revealed that growth was directly proportional to crown size. Trees with the fastest growth rate often had the greatest amount of bark removed. This may indicate that beaver selected the faster-growing trees.

Beaver scars on hardwoods permitted the entrance of wood-decaying fungi. Decay introduced by this method developed in a pattern similar to that for decay in hardwoods following a fire. Toole and McKnight (1955) found that the size of fire scars determined the rate and progress of the decay. Decay traveled fastest in scars extending more than one-fifth of the way around the tree. The decay moved through the sapwood at a fairly slow rate and usually reached the heartwood by the fourth year, but, once in the heartwood, decay traveled faster and moved upward at the rate of 1.3 feet in 10 years. It was not uncommon for beaver to cut into the heartwood, hence speeding the rate of decomposition. Toole and McKnight also stated that scars smaller than 2 inches usually healed before decay was initiated, but scars of greater width probably admitted fungi that eventually destroyed the valuable butt log. Eighteen per cent of the hardwoods of merchantable species received beaver scars that were presumably large enough for the introduction of decay.

A large number of loblolly pines at one colony had been attacked by black turpentine beetles (*Dendroctonus terebrans*). From external appearances, I believe that the beetles entered the trees through the beaver-scarred area. Bennett (1956) reported that adult beetles are attracted by fresh resin or skinned bark and that high populations may build up in fresh stumps or injured trees and spread to healthy trees nearby. These beetles usually prefer trees growing on wet or poorly drained sites or those along streams. Since the trees barked by beaver usually occupied such sites, conditions were ideal for an attack by black turpentine beetles.

Pine trees, when barked by beaver, accumulated a thick deposit of gum over the

scarred area. Since this resin is combustible, considerable damage resulted when a fire burned through a beaver-scarred loblolly pine stand. The pines that had been barked were heavily damaged, while adjacent unbarked pines were not injured.

Water impounded behind beaver dams sometimes floods and kills timber. The greatest damage of this type in St. Tammany Parish was found at a site where 4.5 acres of land had been flooded. A thorough investigation showed that 6.9 cords of pine less than 10 inches in diameter and 20,674 board feet (international one-quarter log rule) of pine over 10 inches in diameter had been killed. In addition, sweetgum, black gum, and tupelo gum were killed. Since beaver in this area do not build dams very often, damage of this type is uncommon.

When beaver do extensive property damage, certain control measures are often necessary. For many years all beaver control in Louisiana was done by the state, and troublesome beaver were removed on requests from landowners. The animals were live-trapped and used for restocking in areas that afforded a suitable habitat, but had no beaver present. As the beaver population increased, requests for removal became more and more numerous. In January 1956, a 30-day trapping season was allowed on beaver in 8 southeastern Louisiana parishes with hopes that troublesome beaver colonies would be controlled. Because of the low value of pelts (\$4 to \$6) and inexperience in trapping and pelt preparation, few beaver trappers finished the season (Smith, 1956). The total season's catch was very small, and it was necessary for the state to continue with its beaver-control program.

In view of the severe damage that beaver are capable of causing, it is advisable to use extreme caution with beaver restocking in areas similar to this, where the value of pelts scarcely justifies public trapping. Re-

moval of animals by the state is a costly and difficult task.

SUMMARY

An investigation of beaver was made in St. Tammany Parish, Louisiana, in 1956. On plots sampled, sweetgum, sweetbay, spruce pine, and loblolly pine received heaviest utilization and were believed to be of greatest value to beaver. Of all plants present, beaver barked 24 per cent and felled 18 per cent. The woody plants felled were very small and of little significance to forestry. Pines barked by beaver were more vulnerable to an attack by insects, and increased the hazard of fire damage. Most hardwoods, when barked, became susceptible to the introduction of decay. Water impounded behind a beaver dam had killed 20,674 board feet of merchantable pine timber.

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Received for publication September 14, 1957.