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The Beaver of Isle Royale National Park, Michigan

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THE BEAVER OF ISLE ROYALE NATIONAL PARK, MICHIGAN

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This is the first summary report of a three-year study of the beaver and associated vertebrates in Isle Royale National Park. The project is a cooperative effort by Purdue University and the National Park Service, with primary support by the National Science Foundation. Emphasis will be placed on relationships of the beaver to the two most influential mammals on the island, timber wolves and moose.

During this first year of the beaver project, field work was limited to the summer months, June to early September, and a week in late October. Course work requirements are being fulfilled on the Purdue campus during fall and spring semesters, 1960-61. This report summarizes the 1960 field work and some of the historical information from the Park Service files on Isle Royale beaver.

Isle Royale is located in northwestern Lake Superior, 17 miles from the nearest mainland-- Thunder Cape, Ontario, Canada-- and about 50 miles from the Keweenaw Peninsula of Michigan. The island is 45 miles long, 5 to 9 miles wide, and contains 210 square miles. The vegetation is typical of the Great Lakes forest-- transitional between eastern hardwood and northern coniferous forest types. It has been modified over large areas by extensive forest fires. Faunistically, Isle Royale is similar to the surrounding mainland except that many of the less mobile forms are absent. The principle mammals are moose, beaver, wolves, red foxes, snowshoe hares, red squirrels, muskrats and mink. Deer and black bear are absent.

The History of Beaver on Isle Royale

In a memorandum for the Superintendent, dated February 15, 1946, Park Ranger Karl T. Gilbert gave an account of Isle Royale beaver up to that date, based on reports and other materials available at Park Headquarters. The following information is abstracted from that report.

In his survey notes made in 1847 and 1848, William Ives mentioned the presence of beaver at four locations-- Washington Creek, Little Siskiwit River, Big Siskiwit River, and a pond between the head of Siskiwit Bay and Lake Halloran. Charles C. Adams reported in 1908 that beaver were probably extinct on Isle Royale at that time. They had been present formerly, but probably were trapped out.

Gilbert found occasional mention of the presence of beaver from 1926 through the 1930's, but he stated that, "Field observations by Park Service employees seem to show that no noticeable increase in beaver occurred until as late as 1943."

On the basis of studies, including an aerial patrol, conducted during the fall and early winter of 1945, Gilbert gave the status of beaver as follows: "Beaver are now present in numbers in all streams, in practically all of the inland lakes, in practically every swamp regardless of its isolation from other bodies of water, and along the shore lines of the protected harbors and bays where natural food is accessible." He reported that a good many worked-out beaver colonies were present, and that severe depletion of available aspen was noticeable. White birch was being cut where aspen was no longer available.

U. S. Fish and Wildlife Service biologists studied the Isle Royale beaver situation in 1946 and 1948 and found that the population was continuing to increase up to 1948. By that time, colonies had been established in practically every available location. Food availability studies showed that supplies of aspen were very low on the southwest two-thirds of the island and were available only in scattered stands on the northeast third. On the center section of the island, embracing the extensive 1936 burn, it was formerly thought that aspen reproduction might provide a substantial food resource for beaver. However, the report of 1948 indicated that the principle food tree in this area was white birch, and that aspen reproduction was low. The high moose population was thought to have an adverse effect on beavers through direct food competition-- specifically by heavy browsing of aspen and birch reproduction-- but no quantitative information was presented on this subject.

About 1949, wolves reappeared on Isle Royale-- apparently by crossing the ice from Canada during the winter. Reports indicate that small numbers had visited the island intermittently during previous decades.

Winter surveys made by L. David Mech, of this department, in 1959, 1960, and 1961, indicate a population of about 20 wolves on the island. Wolf scat analyses made by Mech show that beaver are taken by wolves during the season of open water. In 70 wolf scats collected during the summer of 1958, 17 percent of food item occurrences were beaver. This does not mean that 17 percent of the food was beaver, such information being largely qualitative, rather than quantitative. In 1959, 214 scats were examined, and 12 percent of occurrences were beaver.

Present Status of the Beaver

Field work in 1960 was carried out from 19 June to 2 September, and from 11 to 17 October. The fall work included a 3½-hour aerial survey. A total of 29 sites were located where beaver appeared to be resident. At 11 other sites a single beaver was seen or reported or fresh signs were found. No attempt was made to enumerate inactive sites, since these are so abundant and frequently overlap in such a way that it would be impossible to make a meaningful count. Long stretches of streams-- often half a mile or more-- have been utilized and abandoned.

Two beaver colony maps in the Park Service files, dating from 1945-6, when aerial surveys were made, show respectively 5 and 7 "known dead" colonies, 48 and 47 "known active", and 155 and 164 "status unknown" colonies. There is no indication as to the ratio of active to inactive colonies in the status-unknown category.

The figures from my survey and those from the Park Service maps have severely limited value for several statistical and biological reasons. However, it seems significant that (1) only 5 and 7 colonies were known to be inactive in 1945-6 as compared with the marked abundance of inactive sites at the present time, and that (2) in the whole of my 1960 survey work I was able to find only 29 definitely active sites compared with the 48 and 47 shown on the Park Service maps. This gives some quantitative support to the contention among long-time residents and Park Service personnel that beaver numbers have declined drastically in the last 10 years. There is no indication as to what role the wolves may have played in this decrease.

Young beavers were seen at only one colony-- Cemetery Island-- and were reported to me from one other-- Porter Island. If it be true that young are seldom produced, this could indicate that a shortage of winter food is the major limiting factor. On the other hand, if predation by wolves were the principle limitation, an acceleration of breeding productivity would be expected. Of course, this assumes that beavers show the same reproductive reaction to heavy losses that has been observed in other species. There is also the third possibility that lowered food availability forces the beavers to range widely, making them more vulnerable to the wolves.

In order to determine the sex and age composition, productivity, turnover, and movements of the Isle Royale beaver population, as well as to arrive at an estimate of total numbers, it will be necessary to live trap and mark beaver. This is to be a large part of the summer-fall work of 1961 and 1962. As indicated in the paragraph above, good information on the population structure may be the key to the causative factors in the population dynamics of Isle Royale beaver.

The food requirements of beaver are not well understood. Aspen is generally thought to be the key species; with white birch second in importance. Mountain ash, mountain maple, and willow are used in varying amounts depending upon their availability and the availability of aspen and birch. Whether or not beaver can survive without aspen is not clear. From my observations, it seems that they may be able to do so in areas where there is mountain ash and willow to supplement the birch. Since birch is almost always present in fair amounts around abandoned colonies, it seems unlikely that beaver can subsist on this tree alone.

Food availability is another poorly understood factor. It is often stated in the literature that beaver will travel up to 200 feet from water to get food. Actually the variability is great; topography, ground cover, presence of predators, population pressure, and probably more subtle psychological factors are involved in determining whether or not a given stand of food trees can or will be utilized by beaver.

Other Biotic Relationships of Beaver

Since beavers modify their habitat so significantly, it is natural that they affect many other animals, as well as the flora.

Flooding eventually kills all the terrestrial vegetation growing in the ponded area, and drained ponds present a bare ground environment for the invasion and subsequent succession of plants. Beaver logging often speeds succession by removing seral stage trees-- aspen and birch-- and thereby accelerates the development of climax vegetation. The beaver is primarily a seral stage animal.

The creation of a large amount of pond habitat on streams probably has great significance for fish populations, as well as for certain amphibians and reptiles. Most ponds have a circle of trees around them that have been killed by flooding, and these are common nesting sites for woodpeckers, kingbirds, and starlings. The blue-winged teal, woodduck, black duck, mallard, and ring-necked duck are known to nest on or around beaver ponds on Isle Royale. Muskrats commonly occupy beaver ponds, sometimes while the beaver are still present. The overall effect of beavers on muskrats may be one of providing vastly more usable habitat than is available along unponded streams. Predaceous species such as the great blue heron, American bittern, mink, and fox will inevitably be influenced by changes in availability of frogs, turtles, etc. around beaver ponds.

Plans for Future Work

Future studies will include live trapping of beaver, analysis of food supplies and availability,, and continuation of extensive survey work in an attempt to locate and at least roughly describe all occupied beaver sites on the island. In addition to this work concerned specifically with the beaver, wolf scat analysis, the winter wolf-moose survey, and possibly some fall aerial survey work on moose and beaver will be continued. General ecological work, including plant succession on beaver meadows, and the effects of beaver activities on other members of the fauna, will be fitted in as time allows.