

WOLF-MOOSE STUDIES DEMONSTRATE SCIENTIFIC VALUE  
OF WILDERNESS

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Presumably in February 1949, a pack of wolves crossed 18 miles of ice from Ontario's Sibley Peninsula and established themselves on Isle Royale. The Lake Superior island is the northernmost land in Michigan and one of the nation's 37 national parks.

Before the historic crossing, no national park in the lower 48 states had a breeding population of the gray wolf. Isle Royale, a range of 210 square miles, offered two prey species of significance: moose and beaver. Early in the century, moose had colonized and built up to a point of lethal overpopulation. They had devastated the browse supply and, in the 1930's, died down to a low level. A fire of 1936 destroyed about 20 percent of the Isle Royale forest, and in the 40s this burn was in brush stages that provided an abundance of palatable foods on which the moose could build up again.

This biological history made the park an ideal laboratory for studying relationships of the wolf, dominant carnivore of primitive times, and its largest remaining prey species. A number of mammals important on the mainland had not yet reached the island: deer, bear, coyote, racoon, porcupine, skunk, and numerous small rodents. Relatively, the wildlife community of Isle Royale presented fewer complexities and had more discrete populations (for counting purposes) than those of Ontario or Minnesota to the north.

Under a cooperative agreement between the National Park Service and the Purdue Agricultural Experiment Station, we began a series of student projects on Isle Royale in June 1958. The work involved four doctoral programs and two post-doctorals. In 1975 the study was turned over to the most recent student investigator, Dr. Rolf O. Peterson, who is now carrying it forward from his position on the biology staff of Michigan Technological University.

Isle Royale has been isolated and uninhabited from early November until the end of April—with one exception. Our crew of four were in the winter camp for 7 weeks in February and March. Using a light plane we made counts and followed the fortunes of wolves and moose. Summer work consisted of many hundreds of miles of hiking in teams of two, examining moose remains that could not be reached in winter and studying the habits

of all species. In 18 years of the work, substantial records were secured on more than 1000 dead moose.

The first decade of the study was characterized by relative stability in animal relationships and environmental conditions. A single breeding wolf pack commonly numbered 15 to 17, and the entire population averaged about 24. Moose increased from approximately 700 to 1000, and beavers were increasing from a base population of about 1000 in the early 60s.

Wolves were markedly selective in the predation on moose, taking primarily the calves and older animals. The winter kill was 25 to 30 percent calves. From age 1 through 5 a young moose appeared nearly secure from predation; old moose killed averaged 9-10 years old. The oldest cows were 17.5 years, and the oldest bulls 15.5 years. Many old moose had physical ailments such as arthritis, lumpy jaw, and hydatid disease.

In 1968 wolves entered a 4-year period of minimum numbers (end of winter, 16 to 20). Three out of 4 years, beginning in 1969, brought exceptionally deep snow-3 feet or more. Heavy runoff and abundant summer moisture favored beavers, which built up to about 2000 in the early 70s. At this time moose also were at a peak, numbering 1000 or more. These developments produced major changes in predator-prey relationships.

Wolves increased their feeding on beavers in summer, and brought through unusually large numbers of pups. Their population reached a maximum (for this or any comparable area) of 44 in 1976. In winter the plentiful moose were concentrated by deep snow in lowland conifers along waterfronts traveled by the wolves. These sites were long overbrowsed, and malnutrition affected both calves and adults. The winter kill doubled, half of it being calves. It was new to us to see wolves killing to excess and only partially cleaning up the carcasses.

Now the wolves are taking young adults, a cohort that had been nearly secure. Bone studies showed that greatly increased vulnerability of the 1-to-5 age group was associated with delayed development and maturation. Animals carried in utero during a hard winter, or experiencing such a winter as calves, were killed largely in proportion to their number in the population.

With its recruitment rate reduced, by 1976 the moose herd was down to about 700. Breeding wolf packs had increased to three, and social tensions and inter-pack conflicts had produced at least four wolf mortalities. As of 1978, wolf and beaver populations remained high, and moose may have stabilized. If the weather trend swing back to dry (as it inevitably will) both species must be reduced.

The Isle Royale studies demonstrate how misleading short-term research could be in natural communities. Long-term changes in weather, plant successions, and other environmental conditions will necessitate protracted studies if the full range of relationships is to be revealed. Likewise

it is evident that only in a fully protected wilderness-where the age structure of a moose herd is not altered by hunting, or the social relationships of wolf packs are not disrupted by human influence-could natural events run their full course.

On Isle Royale we have an example of the scientific value of a national park. For the future, some aspects of our biological learning will inevitably-depend on the setting aside and full protection of such areas.