Studies of the timber wolf in Isle Royale National Park

First Annual Report

1958-59

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Lafayette, Indiana
April 30, 1959

THE TIMBER WOLF ON ISLE ROYALE

By L. David Mech

Isle Royale National Park in northwestern Lake Superior is 17 miles from Canada, the nearest mainland. Forty-five miles long and two to nine miles wide, it comprises 210 square miles. Cover types vary from mature stands of yellow birch and hard maple to spruce-balsam swamps and extensive grown-up burns of subclimax aspen and white birch.

Mammal inhabitants are few; the most significant are moose, timber wolves, beavers, red foxes, snowshoe hares, and red squirrels. Coyotes have been reported, but no definite signs were seen this winter. Moose appeared about 1912, probably having crossed the ice, and there were no predators to control their increase. Numbers built up until food supply was nearly exhausted; in the early thirties a sizeable die-off occurred. Forest fires renewed browse, and the population increased again in the late forties. About 1949, timber wolves were reported, undoubtedly having immigrated in winter. Park Service studies in 1953, 1956, and 1957 showed wolves were killing moose frequently, and browse was recovering. These studies also demonstrated the feasibility of using aircraft to count moose and wolves.

Principal support for the present project is a three-year grant from the National Science Foundation. Contributions to the first year of work were made by the National Wildlife Federation and Purdue University. Field administration, use of facilities, and the assistance of personnel are contributed by the National Park Service under the direction of John G. Lewis, Superintendent of Isle Royale National Park. Technical aid is available on request from the Game Division, Michigan Department of Conservation. General technical supervision is under Durward L. Allen, Professor of Wildlife Management, Purdue University.

This study is concerned with the ecology of the wolf, including the extent and effect of predation on the moose herd, and limiting factors on the wolf population. Winters are spent on aerial surveys of moose and wolves while summer work includes habitat studies, observations on prey species, and collecting wolf scats to determine summer food habits. Fall semesters, September to February, are spent in academic studies on the Purdue campus.

Annual progress will be reported after completion of the winter field work. This is at the end of the "population year," and before new wildlife generations are produced.

Summer Field Work, 1958

On June 28, 1958, an advisory committee met on Isle Royale to discuss aims, methods, field techniques, and potentials. The following participated:

Ontario Department of Lands and Forests: Douglas H. Pimlott and Roger Stanfield.

U. S. Fish and Wildlife Service: Laurits W. Krefting.

Minnesota Department of Conservation: Milton H. Stenlund.

Michigan Department of Conservation: Raymond D. Schofield.

National Park Service: C. Gordon Fredine, John G. Lewis, Robert M. Linn, and Robert H. Rose.

Purdue University: Durward L. Allen and L. David Mech.

Field trips were made to the Daisy Farm, Kay Point, Siskiwit Swamp, and Passage Island. The committee reviewed past studies on Isle Royale and made particular observations on browse conditions in various areas. Plans for summer and winter work were discussed. The actual summer field work extended from July 1 to August 20.

A major objective of the summer work was to get acquainted with the island's topography, geography, and vegetation. Thirty-eight days were spent hiking 300 miles, covering the entire 80 miles of trails. Over half the island's periphery was traveled in Park Service boats, and the island was observed from the air for 45 minutes. Headquarters were at Mott Island, but 23 nights were spent in lean-tos and patrol cabins. Browse conditions all over the island were observed, and locations of wolf travel-routes were noted.

All canine scats encountered were collected and analyzed in the laboratory. Moose remains accounted for 59 percent of occurrences in 27 wolf scats presumably made from May to August 1958, whereas beaver remains constituted 17 percent. In 43 wolf scats of unknown age the occurrences were 68 percent moose and 17 percent beaver. This method is undoubtedly the most feasible for obtaining knowledge of summer food habits and will be continued through the next two summers.

Fall Preparations for Winter Field Work

Isle Royale is inhabited from about May 1 to November 15; after the lake freezes, it can be reached only by skiplane. Therefore preparations for winter work had to be made in fall by Park Service personnel.

Large supplies of canned food were stored in root cellars at the Windigo base camp and Siskiwit Bay camp. Smaller stores and sleeping bags were located at Birch Island cabin, Hatchet Lake patrol cabin, Malone Bay patrol cabin, and Lake Desor lean-to for use during snowshoe trips and emergency landings.

Arrangements were made for chartering aircraft from Northeast Airways, Eveleth, Minnesota. A Cessna 180 was used for flights to replace personnel, and a 90 H.P. Aeronca "Champ" for the survey work. Approximately 600 gallons of fuel were stored at a convenient refueling spot at Windigo and 400 at Mott Island.

Windigo was chosen as base camp because of its reliable generators and FM radio link with Park Headquarters in Houghton, Michigan. In fall, generators were winterized and radios were checked. Daily contact with Houghton was planned as a safety precaution.

Winter Aerial Survey, 1959

The original plan for winter field work was to use the aircraft until spring break-up. During the break-up, snowshoes were to be used in tracking wolves. However, aerial work showed that wolves usually travel frozen waterways; human travel on these waterways would be hazardous in late spring. It was also found that these animals may travel 60 miles in one night, and a man on snowshoes could not do 10 in the wet snow. Thus the plan for a late winter ground survey was abandoned. Aerial work proved to be extremely successful, and 110 hours were spent flying on 27 days between February 3 and March 14.

Wolves were censused by direct count. The entire shoreline and all inland lakes were searched on the same day; tracks were followed until the animals were found. During the first encounters with wolves, the animals ran aggressively at the plane, but after that they became oblivious of its presence.

What appears to be a total count of the wolf population was made on February 9. A pack of 15, a group of 3, and a lone wolf were seen within a period of 10 minutes. Possibly there was one additional wolf not seen on that occasion. On this basis, the population is 19 or 20, and the density about one animal per 10.5 square miles. This is a high population compared with reported densities in mainland areas.

Most information on wolf habits was obtained from the pack of 15, which was followed during 16 days from altitudes of 75 to 300 feet; its sign was observed on other flights. Observations were made on movements, social and mating behavior, hunting, killing, and feeding. Six times the wolves were observed chasing moose, and 11 of 12 wolf-killed moose were examined from the ground.

Wolves generally traveled frozen waterways or previously made overland trails. Usually single file, the individuals in the large pack were often far apart, but each followed in the tracks of the animal ahead. The gait was a 5 mph trot. On eight occasions the average distance traveled between kills (usually covered within 24 hours) was 35 miles with extremes of 8 to 60 miles. Direction of travel was unpredictable. When leaving a kill, wolves may continue the original direction or may head back from where they just came.

The Activity Cycle

The pack of 15 wolves appeared to have a three-day activity cycle. Some phases of the cycle were observed repeatedly, others only a time or two. The following tentative outline is based on the limited available evidence.

Having completely devoured a moose carcass, the wolves leave at about 8:30 to 9:30 a.m. and start traveling. From about 11:30 to 4:00 p.m. they alternately rest and run on the ice or a ridge but commonly cover less than one mile. About 4:00 p.m., when moose begin moving, the pack starts traveling steadily. When a moose is scented, usually within a quarter-mile of the route, the wolves stop, point, group up nose-to-nose, and wag tails several seconds. This behavior was noted seemingly whenever a decision was to be made or a message conveyed.

One wolf leads the pack single file toward the moose. If the moose is in heavy cover, or if it senses the wolves soon enough to get into such cover, the pack abandons chase. But if the moose is far from a clump of trees and does not detect the pack in time, the wolves surround it. If the moose runs, they attack its flanks and hind quarters, probably trying to knock it down. When the animal is down or running, and relatively open to attack, the wolves apparently try to sever an artery. Two moose seen surrounded by wolves were bleeding from the throat.

When possible, a moose under attack will run to a clump of trees and make a stand. If the wolves have inflicted a mortal wound, they lie around, presumably waiting for the animal to weaken from loss of blood. If the wolves do not injure moose badly enough before it makes a stand, they give up and leave. They are extremely afraid of the moose's front hoofs and probably do not attempt to finish the animal until it is much weakened.

Usually the wolves are able to kill a moose the night after they leave a previous kill. They seem to eat lightly the night they kill, leaving the carcass before 10:00 a.m. to travel three or four miles to a resting spot. About 4:00 p.m. the pack returns to the kill and feeds until about 10:00 a.m. when they temporarily leave the scattered remains. They return from the resting spot in late afternoon to spend another night chewing bones. The next day another cycle begins. Between February 8 and March 9 four calves and five adult moose were killed and consumed by the large pack.

Observations of Moose Remains

All 11 kills examined from the ground were completely devoured except for a piece of skin and the bones. The long bones and skull of calves were disarticulated, broken and chewed, although those of adults were not broken. Nevertheless, all meat and viscera, and most skin was eaten completely. Thus each wolf ate an average of about 13.5 pounds per day. Of ten femurs examined, the marrow of nine was normally fat, one being fat-deficient. Eleven mandibles were aged by the Peterson tooth-wear method. Four were about 10 months old, one about 6 years, one about 8, and five were over 10 years old. No explanation was evident for the preponderance of old moose killed.

Wolf Behavior

... the ground. They seemed more fearful upon scenting us than when seeing us.

The pack of 15 was composed of a group of 10 and a group of 5. The smaller group often lagged behind the others and slept more. There appeared to be three pups in this group; the other two individuals were presumably parents. This group accepted the company of the lone wolf which appeared unafraid in this company. However, when the group caught up with the other ten, the lone wolf ran away.

Moose Census

After the wolves were censused, a month passed without fresh snow, and more tracks covered the island. The moose census was delayed as long as possible awaiting fresh snow, but finally had to be taken without it from March 8 to 13. Strips were flown at 400 to 500 feet until a group of moose was spotted. Then the plane went into a downward spiral until all in the group were counted, usually at 150 to 200 feet. Because of a low gasoline supply only two-thirds of the island could be censused; 176 moose were seen and the fraction missed is unknown. It is thought to be high and guessed to be one-third. For general purposes 310 moose is a good estimate, but a more accurate figure should be obtained for determination of the effect of predation. It is hopeful that snow conditions will be more favorable in the next two winters.

Effect of Predation on the Moose Population

The heaviest predation on moose probably occurs during winter, for beavers, hares and other incidental food is eaten in summer, as the scat analysis figures show.

For determining the effect of predation on the moose herd the following three essential statistics about the moose herd are lacking: the sex ratio, productivity, and accurate size. The sex ratio and productivity could best be obtained by an early winter aerial survey, although summer observations may provide indications. There is evidence that Isle Royale moose are reproducing at a higher rate than average. The most reliable figure for average adult-calf ratio found in the literature is 100:21, presumably a summer ratio. On the Isle Royale winter census 18 cows were seen with single calves, and 8 more pairs were estimated to be cows and calves; two cows had twins. Thus the Isle Royale winter ratio was an estimated 100 adults (including unproductive yearlings) :20.5 calves. High productivity is also indicated by the two sets of twins seen during the census and a third set observed incidental to wolf observations. Twin calves are rarely observed in winter in any moose populaton.

Limiting Factors on the Wolf Population

Only three of the 19 wolves observed seemed to be pups, indicating either low reproduction or extremely high pup mortality. This might be caused by high-density stress, low food supply, or other factors. Obviously, much more information must be obtained on this important aspect of the study.