



INFORMATION BULLETIN

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Wolves at Isle Royale National Park, Michigan

BACKGROUND:

...In a remote area of Lake Superior, some 18 miles from Canada's Sibley Peninsula, Ontario, and 73 miles from Houghton, Michigan, lie some 200 islands that make up an archipelago formed by volcanism and raked by Ice Age glaciers. At the core is the largest island in the group, Isle Royale--or "Minong" as the Objibwa Indians called it, "the place of blueberries." It is some 210 square miles in size, 45 miles long, and 3 to 9 miles wide, the largest land mass in the world's largest freshwater lake. Essentially a northern forest, a true wilderness, in 1931 it and other archipelago members became Isle Royale National Park.

...Sometime earlier, between 1900 and 1910, moose began establishing themselves on Isle Royale after swimming to the big island from Canada. Within 25 years, as many as 3,000 of them may have lived on this remote island and, as the old saying goes, they had begun "eating themselves out of house and home,"--right down to bedrock. By 1936, only a few years later, this largest moose population the world had ever known about had crashed to an estimated 400-500 due to lack of nutrition.

...A large fire that same year was the population's salvation; it opened the forest's canopy on a fifth of the island, letting the sun reach the forest floor again, and new growth followed. The remaining moose once more had something to eat, but scientists predicted that once the population overbrowsed the island again--probably in another 15 years--there would be another die-off.

...The prediction was never fulfilled as a new act in Isle Royale's drama began in the winter of 1948-49 when upper Lake Superior froze. Briefly, a bridge of ice spanned the water from the island to Ontario's Sibley Peninsula, and during the relatively short time the linkage was intact, a pack of wolves found its way across to the island. No one knows how many originally trekked over the span, perhaps only a pair, but they must have been proficient at living and hunting moose, for they not only survived, they flourished. -- These were



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Eastern timber wolves (subspecies Canis lupus lycaon). Later, with the 1973 passage of the Endangered Species Act, this wolf subspecies (population) was placed on the Endangered Species List. -- An important ecological fact is that the wolves on Isle Royale have no biological connection with wolves in the rest of the State of Michigan.

...In 1960, an aerial census of both the wolves and moose found 20-25 wolves on the island and about 600 moose. The wolves were evidently controlling the moose at a population level lower than the food supply would have controlled them, for browse vegetation species were growing in areas where they had not been seen for decades. Furthermore, the moose seemed healthy, and the cows bearing twins, (a much higher proportion than in the 1930's), had sufficient nutrition to rear their calves.

...Although the wolf population remained at 20-25 animals during the 1960's, a slow increase in the number of moose occurred: There were between 1,000-1,500 of the ungulate, an approximate doubling of their numbers in a decade. The inference seems to be that the ultimate determinant of moose numbers was food supply; yet being prey for some 20 or more wolves meant a much lower rate of population growth.

...About ten years after the wolves arrived on Isle Royale, scientists began observing the wolf-moose relationship, and from planes they recorded what they saw through descriptions of individual wolves, census counts, diagrams outlining the various packs' territories and movements, and descriptions of the wolves' social behavior, including hunting tactics. They also recorded moose numbers, foraging habits, breeding behavior, and methods for surviving wolf attacks. When the scientists could not learn enough from the air, they worked on the ground, often on snowshoes. They analyzed wolf scats, performed field autopsies on what remained of kills, and began piecing together the complex picture of the relationship. (The scientists always remained observers, however, and never actively interfered.)

...Among the things learned on Isle Royale was that a healthy moose in its prime, its 3rd to 8th years, is almost invulnerable to a wolf attack. Lashing out with sharp hooves backed by the strength of its half-ton body, a healthy moose is a formidable opponent. From experience, wolves know this; from experience, moose know that the wolves know. Consequently, moose often stand their ground when confronted by wolves, and wolves usually "test" about 20 adult moose for vulnerability before they pick one to actually try to bring down. In the end, it is generally the old or the otherwise weakened among the wolves' adult prey that the predators cull from the herd, accounting for 90 percent of moose deaths on the island. Calf moose are also targeted by wolves, but before wolves can take a young moose, they must somehow distract or outmaneuver the mother for she, too, will stand up to the wolves, confident in her ability to drive them off.

...The approximate median number for moose population over the 41 years that wolves have been present on Isle Royale has been 1,000, while the wolves' median number during that time has been 23. The actual numbers for both animals each of these years have fluctuated significantly.

THE RECENT AND CURRENT SITUATIONS:

...In 1980, the island's wolf population reached 50, its largest number ever. Then the population dropped to 14 within the next 2 years, a crash that coincided with an acute food shortage and also the likely arrival of the disease canine parvovirus (CPV).

...By 1984, the wolf number had risen again, this time to 24--the same count as in 1961. But then a long fall in numbers began. By March 1988 there were only 12 wolves, and at last count, March 1989, there were 11--the lowest number since the wolf surveys began. (One of these 11 was a pup born in 1988, a hopeful sign, for although the rate of decline has slowed among the wolves, the lack of successful reproduction remains a major concern.)

...Moose numbers grew quickly after the wolf population crash in 1981, and most of the moose now on Isle Royale were born after that date. In 1988 this put most of them either in the prime of their lives or slightly younger, with only a few entering their years of vulnerability. However, the winter of 1988-89 saw moose dying in fairly high numbers, heavily infested with winter ticks. Whether or not they will increase further remains to be seen.

...Of the 11 wolves left, there are 5 males and 5 females plus 1 pup in 4 separate groupings, creating the potential for 4 mated pairs; they are traveling in small groups of 3 or fewer.

...In 1988 the NPS began an investigation into the cause of declining wolf numbers, with the major hypotheses being:

- < Lack of food (due to the moose population's age structure, which is predominantly young and healthy);
- < Disease (focussing on canine parvovirus (CPV) and Lyme Disease, in particular); and
- < Excessive loss of genetic variability because of the population's members being so closely related.

With the increased number of moose dying in winter 1988-89, however, the scientists will be able to write off "lack of food" as a potential reason for wolf decline if the wolf does not make a turnaround in numbers.

Early in the investigation in 1988 the scientists live-trapped four apparently healthy wolves (2 males, 2 females). After administering a relaxant to the animals, they took blood samples for screening for all kinds of canid diseases as well as for everything physical the scientists needed to learn. They then radio-collared the animals, using collars that signal if a wearer is immobile for an inappropriately long time, a probable indication of death. (Such collars permit the scientists to respond immediately to perform an autopsy to determine the cause of mortality of the wolf.) After the collaring of each wolf, the research team stayed a few hours with it--long enough to ensure its complete recovery. Then the researchers released the animal.

...Now, a year later, these 4 wolves still appear healthy, but none reproduced. With the capture of two more females in August and September 1989, all but one of the adult females on the island has been examined. Only one of these 4 female wolves reproduced in 1989.

...Laboratory results showed that, of the first 4 wolves trapped,

- < Two tested positive for canine parvovirus antibodies.
- < Three of the 4 tested positive for Lyme disease antibodies.
- < All 4 animals tested negative for heartworm.
- < Three of the 4 were positive for canine hepatitis.

Where the tests indicated that the animals were positive to disease antibodies, the interpretation can be only that the wolves have been exposed to these diseases. (Parvovirus and Lyme disease antibodies are not passed from mother to offspring.) Canine hepatitis is a common canid disease, but is not thought to be a significant factor in the current situation at Isle Royale.

...A meeting of 26 wolf biologists, NPS scientists, and all scientific collaborators involved in the current investigation into the wolf decline took place in March 1989 in Minneapolis. The group reviewed the evidence that disease is playing a major role in the population dynamics of wolves in the region, and specifically at Isle Royale, and tentatively concluded that CPV is not a current threat, but Lyme disease could be impacting reproduction. Data from more wolves will be required to evaluate risks from disease and loss of genetic diversity.

...Many discussions at the meeting focussed on research scenarios to test the major hypotheses for the wolf decline, and all of the following are considered current possibilities:

- < Canine parvovirus (CPV) disease.
- < Lyme disease, carried by a tick to which the wolves have been exposed.
- < Other diseases and/or parasites.
- < Shortage of food due to the moose population's age structure, which is predominantly young and healthy.
- < Excessive loss of genetic variability because of the wolf population's members being so closely related.
- < Random events.

...The NPS scientists and park managers have used the ideas generated at the March meeting to develop strategies for the management of the remaining wolves. They also have begun to formulate alternatives for the longer term for, if wolves die out at Isle Royale, ecosystem effects are likely to be profound.

...In being the cardinal predator on the island, the wolf, through its heavy predation on moose, makes it possible for there to be a greater diversity and abundance of other mammals there, and enhances the quality and quantity of browse vegetation available for moose and other herbivorous animals, especially beavers and snowshoe hares. (Although deep snow and harsh winters also help

delimit moose population, they do so only in conjunction with wolf predation.) Without the wolf, not only will the diversity and abundance of other mammals diminish, but the forest community structure and functions also can be expected to change, influencing other predators, birds, invertebrates, and plant species.

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