



Wolf behavior: a history of its study in North America
by Karen Ann Fischer

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF ARTS in
History

Montana State University

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Abstract:

The scientific study of wolf behavior in North America is a recent development. In the early twentieth century published information was based on the observations of government trappers hired between 1915 and 1940 to eliminate the wolf as a threat to livestock. Popular literature of the time portrayed the wolf as dangerous, not only to livestock, but to game animals—and humans as well. Stanley Young of the U.S. Biological Survey wrote two books detailing the war on wolves (The Wolf in North American History) and their behavior (Wolves of North America, pt. 1.). The latter was the standard work, though inaccurate, for thirty years.

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Captive wolf packs studied in zoos led to detailed information of the social dynamics within and between wolf packs. Chief among the researchers in this country are W. Michael Fox and Erich Kling-hammer.

Based on the new scientific information, popular literature on the wolf from the 1960's on began to portray it as a much maligned animal worthy of preservation. At the same time the old stereotype persisted in areas where the wolf still exists, creating management problems for the governments involved.

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IN NORTH AMERICA

by

KAREN ANN FISCHER

A thesis submitted in partial fulfillment
of the requirements for the degree

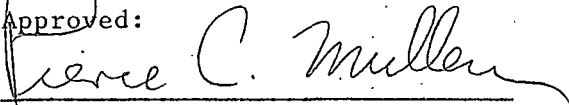
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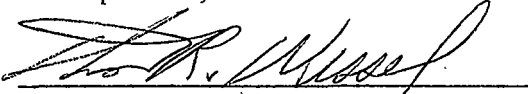
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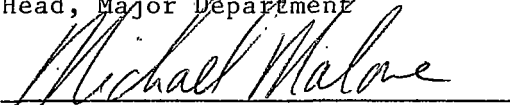
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ABSTRACT

The scientific study of wolf behavior in North America is a recent development. In the early twentieth century published information was based on the observations of government trappers hired between 1915 and 1940 to eliminate the wolf as a threat to livestock. Popular literature of the time portrayed the wolf as dangerous, not only to livestock, but to game animals and humans as well. Stanley Young of the U.S. Biological Survey wrote two books detailing the war on wolves (The Wolf in North American History) and their behavior (Wolves of North America, pt. 1.). The latter was the standard work, though inaccurate, for thirty years. ☆

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INTRODUCTION

Wolves figure prominently in folklore and myth. Only in the twentieth century did wolves become the subject of scientific scrutiny. Initially these studies were directed to the problem of exterminating the wolf. Their depredations on livestock in the western grazing districts occasioned these first federal analyses. Government biologists, especially Vernon Bailey and Stanley Young, were interested in discovering wolf ecology and behavior in order to destroy them. In most cases this campaign was successful and wolves disappeared in all but a few places in the country.

Eliminated as a threat to domestic stock, the wolf now became a lonely symbol of wilderness. Certainly some of the nostalgia was romantic and idealistic. But in those remote and inaccessible places where wolves could be found, scientific work with a new perspective was undertaken. Adolph Murie's classic study originated because of concern about preserving Dall sheep in Mount McKinley National Park. In good Darwinian fashion, it was thought that a balance in nature might be achieved through careful game and wolf management.

Only in the past twenty years has the wolf been deemed worthy of both study and preservation in its own right. Pack structure could be elucidated through a knowledge of captive animals. Scientists elevated the status of the wolf to that of a mammal with a highly developed social organization. Comparative animal behavior,

aggression patterns and territoriality became foci for numerous studies, including those focused on wolves.

At present the wolf is an endangered species and only a few can be found in the continental United States. Attempts to relocate the animal to areas where it was exterminated in the past have not been successful. L. David Mech, who is known for his classic study on Isle Royale wolf packs, is considered by most to be the standard authority on the North American wolf. In the habitat of Isle Royale timber and water play an important ecological role. It may well prove with time that the description of wolves he provides for heavily timbered northern Minnesota will not hold true for the treeless tundra wolves of the far North. But he certainly understood the human factor in his studies and has a keen appreciation of the importance of human interaction with the wolf. Wolf survival hinges on this interaction. What follows is a description of the scientific literature leading to this assertion.

I: THE MASTER CRIMINAL OF THE ANIMAL KINGDOM

"Speedily the wolves were close enough for their panting breath to be distinctly heard by the unhappy travelers. Then the carriage was surrounded by them, and the only chance of escape was to cut the traces on one of the horses and let it loose, so that it might stop the hungry animals whilst the other horses were being urged madly on. This was done, and the pursuers seizing on it were for a time occupied in devouring it, the party meanwhile making their escape. But the horse was soon demolished among the hundred or more, and with their appetite quickened by the fresh taste of blood, the chase was renewed. Again the pack came up with the lumbering vehicle, now moving more slowly because of the loss of a horse; another was cut loose, and the wolves fell to their meal, but as before the coach was soon pursued and again surrounded. A third horse was given, but this did not suffice . . . only two horses were now left, and without either of these it would be impossible to proceed.

At this moment the faithful coachman let down the front window, threw the reins through it to his master, and commending to his kind care his poor wife and children, without another word sprang down among the wolves. The Baron protested, but it was too late: the noble-hearted domestic had freely given himself to a horrible death that he might occupy the wolves for the few minutes that would enable his master's family to escape. ¹

So went one of the innumerable accounts of wolf-human encounters from the 19th century. Vilhjalmar Stefansson, the early twentieth century explorer, researched many versions of such encounters with mythical wolf packs, usually at least a hundred strong, attacking

¹Bell, M., "Habits and instincts of wolves," Month, a Catholic Magazine, 60. (1887), 489-490.

travelers desperately trying to appease them by throwing objects, including children and brides, out of carriages and sleds, to give time for one last dash to safety. Interestingly among the Eskimos, who did not fear wolves, it was a whale from which a brother and sister tried to row to safety in a boat. Various articles of the sister's clothing were thrown to the whale and the two escaped, but not until the sister was left naked. Stefansson concluded that the similarities of such monster stories from so many parts of the world cast serious doubt on the supposed villainy of the wolf.¹ He claimed the largest wolf pack never reached more than eleven members and was made up of a mated pair and their previous offspring.

Almost all groups of people who shared territories with wolves included them in some fashion in their folklore or mythology. How a particular people viewed their local specie of wolf depended more on the nature of the human society than on that of the wolf. The wolf, while highly adaptable, maintained a consistent core of behavior regardless of location, but people fell basically into two groups: the hunters and the agriculturists.

The hunters tended to appreciate the wolf's ability to live as a hunter like themselves. They colored it in their language and legends with qualities they admired: intelligence, strength, cooperation, and courage. Both human and wolf hunters attacked large prey with the possibility of personal injury and found safety

¹Stefansson, Vilhjalmar, "The Mythical Wolf Pack," Colliers 71 (April 21, 1923), 27.

in attacking in cooperative groups.

Agricultural peoples with domesticated prey colored the wolf differently. It wantonly attacked in the dark of night what was not its to take, eluding human senses, and leaving only its footprints and its unnerving howl as evidence of its presence. To these peoples it was an arch villain, a depraved, vicious, blood-thirsty killer, devouring at will anything that lived.

The world-wide spread of agriculture, especially the grazing of domesticated livestock, spelled the doom of the wolf. With both habitat and its natural food supply eliminated, the wolf turned to killing livestock and came into direct conflict with agricultural man. All over the world the range of the wolf relentlessly shrank, until in the twentieth century it was limited to an essentially circumpolar area. Major populations remained in Russia, Canada, a few survived in Finland, Sweden, and the more inaccessible mountainous regions of eastern Europe, the Middle East, and India. The Soviet Union, Finland, and Sweden had policies of declared or undeclared extermination.

In North America the wolf coexisted with native peoples who generally respected and did not fear it. Various Indian tribes experienced wolf predation on their horses, and they retaliated by killing wolves, but they did not view the wolf with hatred. Barry Lopez quoted early accounts of how some tribes even removed pups from

dens and played with them, always returning them to the den unharmed afterward.¹

The advent of white settlers with their domestic livestock signalled the beginning of the war of extermination. The first North American bounty on wolves was established in 1630 in Massachusetts,² and for the next three and one half centuries the spread of white civilization westward included the spread of the bounty system in some form.

Wolves were killed by many methods. Shooting with either bow and arrow or gun, pit and deadfall traps, coiled whale bone embedded in hunks of fat to unwind and pierce the stomach, all have long histories. Young said that early explorers approached and clubbed wolves to death because they did not fear people and stayed so close to humans slaughtering buffalo. Indians killed a buffalo and waited one day for the wolves to gorge themselves. The sleeping wolves were then so lethargic, the Indians found them easy targets.³

In the first half of the nineteenth century wolf numbers were greatly reduced in the area east of the Mississippi, mostly by trapping and the elimination of hiding places, although some poison was used. After the Civil War the western plains were developed for agriculture

¹Lopez, Barry Holstun, Of Wolves and Men (New York: Scribner 1978), p. 124.

²Young, Stanley Paul, The Wolves of North America (Washington: D.C., American Wildlife Institute, 1944) p. 340.

³Ibid., p. 120.

in an incredibly short time. The completion of the Union Pacific Railroad in 1869 provided easy access to the buffalo grazing lands, and at the same time divided the animals into two herds, the northern and the southern. The southern herd was wiped out in just seven years according to Young.¹ The railroad made the marketing of hides, tongues, and tallow profitable. Professional "wolfers" contributed substantially to the slaughter by using buffalo carcasses as bait for poisoning wolves. The Northern Pacific Railroad was completed in 1881 and within another seven years the northern herd too was gone. Cattle followed close on the heels of the vanishing buffalo. Stanley Young quoted an 1884 estimate by the Colorado Livestock Record that close to five million cattle were driven north from Texas to Colorado and farther between 1866 and 1883.²

Now the North American bison was a formidable prey for the wolf. Cattle, on the other hand, even the half wild cattle of the plains, proved much easier to kill and the hatred of cattlemen for wolves escalated into something of a holy war. Seton estimated that before the coming of the whites, there were roughly two million wolves in what is now the United States.³ While the western cattlemen accepted

¹ Young, Stanley Paul, The Wolf in North American History (Caldwell, Ida., Gaxton Printers, 1946) p. 101.

² Ibid., p. 103.

³ Seton, Ernest Thompson, Lives of Game Animals 1 (Garden City, N.Y., Doubleday, Doran, 1925), p. 261.

stock losses from other causes (weather, starvation, disease), they did not accept it from wolves. Associations were formed to protect the cattlemen's interests and one thing on which they agreed was the necessity of bounties on wolves. In Wyoming in an eleven year period bounties were paid for over twenty thousand wolves.¹ Montana paid over three hundred thousand dollars for more than eighty thousand wolves between 1883 and 1918.²

How were wolves killed in such tremendous numbers? What about the legends of the canny outlaws impossible to catch? With bounties by both governments and cattlemen's associations and the hide to sell on the fur market, there arose in the 1860's a class of trappers who could live year round from "wolfing". The cattlemen and the professional wolfers fought the war against wolves in three ways: shooting them on sight, trapping with steel traps, and poisoning with strychnine. The first method soon proved ineffective since the wolves learned quickly to stay out of range.

Traps came to the new world with English colonists, based on the rat trap. Made by blacksmiths in several designs and sizes, most were really meant for animals no larger than beaver. It was Sewell Newhouse of Brattleboro, Vermont, who designed a basic trap available in eight sizes which became standard equipment for the Hudson's Bay Company trappers.³ He began the first commercial company

¹ Seton, Op. cit. p. 261.

² Lopez, Barry Holstun, Of Wolves and Men (New York, Scribner : 1978) p. 183.

³ Young, Op. cit. p. 51-52.

in North America to manufacture traps for the taking of wild animals in 1855. His design was a great success and between 1861 and 1869 his company produced three-quarters of a million traps for use on everything from mice to bears.¹ For most of the latter part of the nineteenth century the Sewell trap caught wolves effectively and his basic design remained the trappers' favorite right up into the twentieth century.

Strychnine was even more effective than trapping. Strychnine came from the seeds of an orange-like fruit of a tropical tree originally from India.² The poison was known and used in Europe as early as 1640. The colonists and early citizens of the Republic had to import it. The first American company to manufacture it was the firm of Rosengarten and Denis, which set up shop in Philadelphia in 1834, and was soon distributing it throughout the continent.³ Strychnine use in the West began when a shipment destined for South America landed instead in San Francisco on board a ship that changed direction in mid-voyage after hearing of the gold rush.⁴ Opportunists found easy trapping with strychnine supplemented their income.

¹Young, Op. cit., p. 54.

²Young, Stanley Paul, The Wolves of North America (Washington: D.C., American Wildlife Institute, 1944)p. 323.

³Ibid., p. 324. ⁴Ibid., p. 325.

In the early years on the plains, from about the 1860's to 1880's wolves were easily caught. The sound of a gun attracted them, for they associated the buffalo slaughter with an easy food supply. They were known to sit in a circle surrounding a wolfer while he laced a buffalo carcass with strychnine, waiting for him to leave so they could feast.¹

Eventually survivors became quite wary. If a human hunter killed a large animal far from camp and needed to leave it overnight unprotected in wolf country, he merely left something with his scent on it on or near the carcass, a piece of metal or a handkerchief would do.² The wolves shied away from anything with human scent on it. They learned to recognize the smell of strychnine, and according to Seton, became very hard to poison, except for young pups in the fall of the year when they first ran with the pack. Seton, who himself hunted wolves, firmly believed wolves were intelligent animals who not only learned to avoid traps and poison themselves, but communicated what they knew to their young and other adult comrades. Ironically the very methods used against them helped to make wolves more destructive. They learned not to return to a kill, but to kill fresh for each meal.

The fate of the wolves in the United States was sealed when the federal government became involved in their extermination. By the

¹Young, The Wolves of North America, p. 124-125.

²Seton, Ernest Thompson, Life Histories of Northern Animals, II, (New York; Scribner, 1909), p. 765.

early twentieth century most of those involved agreed that bounties did not bring the desired result: the total elimination of the wolf. With state and local governments and cattlemen's associations all paying bounties, and as little as ears or noses required for proof of an animal as a wolf, fraud became widespread. According to Young by 1914 over one million dollars a year was being paid for bounties in the war against wolves.¹ Eventually local and state governments grew weary of draining their treasuries. Cattlemen demanded protection for their stock grazing on national forest land for which they paid grazing fees. Together they pressured the federal government for help. The agency charged with investigating the problem and coming up with solutions was the U.S. Biological Survey, originally with the Agriculture Department and later under the Department of the Interior. After sending its own naturalists to investigate, the Survey published a pamphlet on how to best eliminate wolves.

A major new tactic described by Vernon Bailey in one of the Survey's Circulars was "denning".² Wolves bred early enough in the spring so that they could be tracked to the den site while snow was still on the ground. Killing pups was easy, since the adults were extremely

¹Young, The Wolves of North America, pt. 1, P. 381.

²Bailey, Vernon, Directions for the Destruction of Wolves and Coyotes, Circular no. 55, (Washington, D.C.: U.S. Bureau of Biological Survey, April 17, 1907), p. 1.

wary and stayed out of range, helplessly howling and barking at the killers.

Beside the free advice to private individuals, a formal government program was established. In 1915 one-hundred-twenty-five-thousand dollars was appropriated by Congress for predator control.¹ Professional trappers were salaried and equipped for elimination of wolves and other predators. After fifteen successful years Congress was convinced in 1931 to spend up to a million dollars a year for a ten year period to control predatory mammals and rodents.² When the program ended in 1941, the Biological Survey in cooperation with the Forest Service had killed over twenty-four thousand gray (*Canis lupus*) and red (*Canis niger*) wolves since 1915.³ As Stanley Young stated in his account of this program: "No other nation has ever paralleled the United States with any similar legislation or operations looking toward wolf and other predator control."⁴

¹Young, The Wolf In North American History, p. 142.

²Ibid., p. 144. ³Ibid., p. 146. ⁴Ibid., p. 145.

II: THE BEGINNINGS

A lot had been written about the wolf by the 1940's, an awful lot. Most of it did not bear close examination. More than one generation grew up on Jack London's Call of the Wild and White Fang; many more saw the movie versions. Endless adventure stories (all true to life, of course) were not complete without at least a hint of danger from wolf or wolves. And there were the outlaw stories, accounts of the last of the plains wolves and how, after many escapes, the cunning killers were reluctantly dispatched by the wily trapper who succeeded where everyone else had failed.

In reality very little was known about wolf behavior. Many of the early explorers reported on encounters with wolves. Trappers added their observations on what helped to trap wolves and on how much wolves deserved their fate. But by the twentieth century the picture was still distorted. Ernest Thompson Seton, the well-known naturalist illustrator, drew on his background of trapping wolves to write both books and magazine articles about them. He concluded that the male and female wolf stayed together as a mated pair throughout the year and perhaps even for life. Supposedly based on his own observations he described their various vocalizations.¹ The "muster" or "rallying cry" was voiced by a single wolf who called his friends to help him dispatch a prey too large to handle by himself. The

¹Seton, Ernest Thompson, Life Histories of Northern Animals, II (New York: Scribner, 1909), p.770.

"hunting song" was the sound of the pack pursuing prey, like a pack of domestic hounds after a fox. Another bark-howl combination was the "closing-in" when the wolves had cornered their prey and were about to finish it off. There were other sounds between wolf mates or between mother and young which Seton did not feel competent to decipher as to meaning.

Perhaps the most comprehensive work to mix fact and fiction about the wolf was The Wolves of North America, part I, subtitled: "Their History, Life Habits, Economic Status, and Control", by Stanley P. Young. Young, a senior biologist with the U.S. Fish and Wildlife Service, was involved in the Biological Survey's efforts at eradication, and for a while made a living from killing wolves. He seemed eminently qualified to write such a book, which was published the same year as Adolph Murie's pioneering study.

Young gave a fairly complete picture of the wolf. It hunted by exhausting its prey after a chase of many miles. Since wolves had been clocked by automobile at a top speed of about twenty-eight miles per hour, they appeared too slow to catch prey like deer or elk. Old trappers claimed wolves hunted in relays and spelled each other. Certainly chases had been witnessed more than once where the prey was exhausted and the wolves still fresh, so the conclusion seemed probable enough. Young was aware of Sigurd Olson's study of wolf predation on deer in northern Minnesota in 1938. Olson concluded that

wolves took the young, the old, and the weak.¹ Young believed that since wolves took livestock in the prime of health, it only seemed natural to conclude that with this hunting technique all wild prey were subject to their hunger also.²

Young based a lot of his information on what trappers told him as well as his own experiences trapping wolves. Trappers agreed the wolf was territorial and "runways", well worn paths much used by particular wolf packs, were found by Young. Based on this and beliefs of trappers before him, Young concluded wolves had basically circular territories about twenty miles in diameter if prey were plentiful, and ranging up to sixty miles if prey were scarce. The circumference of this rough circle could be as much as a hundred miles and the pack patrolled it regularly looking for game.

He detailed five types of wolf vocalizations which agreed with what Seton had said, including this description of the "call of the kill": "It is a deep snarl produced by exhaust of air through the wolf's partially opened mouth as it hangs on with teeth sunken into the flesh of its victim."³

¹Olson, Sigurd F., "Study in Predatory Relationship with Particular Reference to the Wolf," Scientific Monthly 46(April, 1938), 323-336.

²Young, Stanley Paul, The Wolves of North America, Pt. I. (Washington, D.C., American Wildlife Institute, 1944), p. 268.

³Ibid., p. 77-78.

Wolves were so shy of people by the time of Young's writing, it was safe to assume they did not kill while humans stood close enough to hear their sounds. Young did not explain where or if he personally had heard this particular sound.

Because of the practice of denning, trappers knew a lot about where wolves were likely to site a den. Young stated that pups could go as long as the first month without water so that dens were not necessarily found near rivers or streams. Adults cached large amounts of food near the den for the pups even before they were born. After about three months, pups joined the adults on the runway. When a kill was made, they stayed several days in the same area until it was consumed, and then resumed their patrol. Young called these places "loafing spots". Adults taught pups to kill in late summer. Adults liked to attack in pairs; one, usually the female, went for the head, while her mate hamstringed the animal from the rear. The pups were sometimes allowed to stay through to the next breeding season, which explained why wolves of various sizes were seen emerging from denning areas.

Lone wolves were usually old males who had lost their mates. Since wolves mated for life, once the partner was gone, the remaining wolf no longer participated in group hunting. A wolf pack consisted of a single family and perhaps the two year old offspring. Occasionally two or more families joined together, but Young did not believe this association lasted very long.

While Young thought the wolf basically afraid of humans, at least by the twentieth century, and of no danger to them, he also included accounts of wolf attacks. Both in Europe and North America there were so many such stories that, as he put it: "Where there is so much smoke, there must be some fire."¹ He did not speculate on what percentage of attacks could be attributed to rabies or starvation, although he mentioned them as possible motivation for at least some attacks.

This then was the standard version of what wolves were like. It varied little from what St. George Jackson Mivart wrote in 1890, except that he thought the males fought for the privilege of mating with the females each season, and wolves ate anything they could find, including small animals, birds, fruit and buds.² The only recent researcher who agreed with Mivart on wolf feeding habits was Sigurd Olson. In a study published in 1938 he stated that "Anything that crawls, swims, or flies may be included in their diet."³ For the most part, however, Young's version of things prevailed.

¹Young, Wolves of North America, p. 128.

²Mivart, St. George Jackson, Dogs, Jackals, Wolves, and Foxes, (London: R.H. Porter, 1890), p. 5.

³Olson, Sigurd F. Op. cit. p. 329.

III: ADOLPH MURIE AND MOUNT MCKINLEY

"This book is dedicated to Adolph Murie, who in the early 1940's became the first biologist to conduct an intensive and objective ecological study of the wolf."¹

So read the dedication of L. David Mech's book, The Wolf: The Ecology and Behavior of an Endangered Species, published in 1970. Almost every researcher between Murie and Mech declared Murie's work a classic. By the 1930's wolves were eliminated as a threat to livestock in the lower forty eight States. There remained a worry that they took too many big game animals which could otherwise be harvested by hunters in areas like Alaska. Human experiments with domesticated reindeer provided a new source of food for wolves and an extensive control program was underway. The question arose of what policy should be followed in Mt. McKinley National Park which lay in the heart of wolf country and had its share of wolves. Murie was in the employ of the Fish and Wildlife Service at the time and was assigned to study the wolves of Mount McKinley. In his foreword Murie asked some important questions:

...What, for instance, is the total effect of the wolf preying on the big game species in this national park? What is the relationship between the wolves of the park and the general wolf population of Alaska? How do such predators as the golden eagle, fox, grizzly bear, and lynx affect the hoofed animals? In short, what is the ecological picture centering about the wolf of Mount McKinley National Park?²

¹Mech, L. David, The Wolf (Garden City, N.Y.: Natural History Press, 1970), p.[v.].

²Murie, Adolph, The Wolves of Mount McKinley, (Washington, D.C.: U.S. Government Printing Office, 1944), p. xiii.

His study lasted a little over two years, from April 1934 to August 1941. Although he had some help the first year from two Civilian Conservation Corps members, in 1940 and 1941 he worked alone. Here indeed was a study which might damp the enthusiasm of armchair adventurers attracted to the "romanticism" of wolf research. In 1939 Murie walked approximately 1700 miles! From an automobile road which cut through the heart of the sheep ranges, Murie had himself let out to hike a semicircle of nine or ten miles each day to rendezvous with a car farther down the road. Along his hike he examined sheep skulls and wolf droppings (scats). In all he collected 829 sheep skulls and 1,174 wolf scats, most of them the first year.

Most wolf research to this time was conducted by people who were interested in its extermination. Since they had plenty of carcasses to examine, previous studies analyzed stomach contents to find out what wolves ate. Young cites a study involving 3,346 wolf stomachs taken from wolves caught in steel traps.¹ Murie noted that no disturbance of animal life in a national park was allowed until a scientific study had been made. As he put it:

Killing the wolf to examine the stomach contents, in this case, was too much like killing the goose that laid the golden eggs. A dropping tells almost as much...²

From his analysis of scats Murie found the principal food of wolves was caribou and mountain sheep with some ground squirrels, marmots,

¹Young, Stanley Paul, The Wolves of North America, pp. 212-213.

²Murie, Op. cit., p.1.

and mice also eaten. The sheep skulls he divided into four groups by age: lambs, yearlings, prime, and old. He found few sheep between two and eight years of age represented by skulls, and of those that were, most were diseased. From this and past observations of relative sheep and wolf numbers with the Park, he concluded that in 1941 wolves and sheep were in equilibrium and it appeared that wolves were keeping the sheep population in check.

He also spent a considerable amount of time observing a particular pack of wolves and described both hunting and denning behavior. Of the three packs he observed, the one centering on the East Fork River garnered the most hours of observation. He spent a total of one-hundred-ninety-five hours at this particular den site, including one session of thirty-three hours straight.¹ He observed not only a mated pair but also three other adult wolves, a female and two males, all at the den site. Later when the group left the den permanently, they were joined by two more male wolves. These seven adults stayed together for two years.

The second spring both females had young in two separate dens. Later when the pups were old enough to travel, the second female moved her pups to the rendezvous site of the first and both litters were raised together with all adults bringing food to them. For the first time there was direct evidence that a pack structure of more than an immediate family existed year round.

¹Murie, Op. cit., p. 24.

The hunting behavior Murie observed reinforced the evidence he got from the skulls. Wolves did not take sheep at will. Murie wrote:

Theirs is not a lazy life for the nature of their food demands that they travel long distances and work hard for it, but they seem to enjoy their nightly excursions.¹

They chased many sheep before they found one they could catch. Sometimes the whole group hunted, other times a group of two or three and sometimes a single wolf hunted by itself. They travelled on a park road which gave them the advantage of getting above the sheep on steep slopes. If a wolf could put on a short burst of speed from above, the sheep had less chance of climbing upward past it to safety.

One of the original fears about the wolf was the extent of its predation on Dall sheep. Murie found that it preferred to feed on caribou, especially the calves. Even after the main herd migrated through the park, the wolves managed to live off stragglers. When caribou were lacking, wolves turned to marmots and ground squirrels rather than sheep. The exception was when there were few caribou calves in spring, wolves preyed on Dall sheep lambs. In winter, however, sheep were the major prey of wolves. In years of deep snow sheep became weakened and provided easier prey for the wolves as well as carrion. Murie concluded: "The wolf and the mountain sheep have existed together under conditions largely as at present for a long time, so that an adjustment between them, whereby both can survive, should be expected."² What Sigurd Olson concluded about Minnesota

¹Murie, Op. cit., p. 34

²Murie, Op. cit. p. 124-125.

wolf predation on deer in 1938, Murie felt held true for wolf and sheep in Alaska. While wolves searched for vulnerable animals and might surprise and take a few healthy ones, in the long run it was the weak members of the population which made up their main diet.

Above all, from his extensive observations of particular packs, Murie was impressed most with the wolves' friendliness to each other. He gave several examples. All adults were friendly with the pups. When the pups were old enough to play outside the den they often crawled over all five adults. If the play got too boisterous around an adult, it would move farther away where it could rest in peace. Before leaving for the evening hunt, the wolves had a general greeting ceremony with much tail wagging, nuzzling, and frisking. Then all stopped and howled. The female returned to the den and the others departed for the evening hunt. Several times the grey female, who was the mother of the pups, participated in the hunt, a second black female staying behind at the den.

Murie implied that each female in a pack had her own den and produced a litter, which might later be combined with any other litters in the same pack structure. The pups from 1940 ran with the pack until the spring of 1941 and then were seen with the parent pack no more. Murie noted that one wolf, "a tall, rangy male with long silvery mane and a dark mantle over the back and part way down over the sides"¹

¹Murie, Adolph, Op. cit., p. 28.

was the leader, although he was not mated to either of the females. He was nicknamed "the Dandy" because "his tail waved jauntily and there was a spring and sprightly spirit in his step."¹ The others approached him in a "cowering" fashion.

He also noted that wolves were territorial, although not necessarily following a circular route through it and that territories overlapped. He once watched the East Fork Pack attack a strange wolf who approached them at the den site and cowered on his side before them. At first they all sniffed each other and wagged tails slightly, but led by the Dandy, they suddenly attacked the stranger. He fled and they pursued him, catching and knocking him down several times. When about two hundred yards from the den the others left, but the Dandy continued and harassed the stranger until it left, its hip and tail bleeding.

At one point Murie entered the East Fork den and took a pup to raise as a captive. The adults offered no resistance except to hide nearby and howl and bark at him. He did not carry a gun and did not feel threatened by them at any time during the study.

With Murie's study and those who came after him, the emphasis was changed from those like Young who had gone before. The war was over. The wolf had vanished permanently from most of its former range. For the most part where it still existed, it was no threat to livestock

¹Murie, Adolph. Op. cit., p. 28.

because there was so little livestock in those places. The wolf came to have a different meaning to those who studied it. As Murie explained the time he spent watching the East Fork den: "For three or four hours at a time there might not be a stir. Yet it was an inexhaustible thrill to watch the wolves simply because they typify the wilderness so completely."¹

¹Murie, Adolph. Op. cit. p. 29.

IV: THE DECADE OF THE 1950's

In the decade of the 1950's modern game management became the focus of research. The wolf was studied in relation to how it affected the management of various game animals. Its North American range was now limited to Alaska, Canada, and Minnesota, with a very few in Michigan and Wisconsin.

Canada, with a large area of sparsely populated land, never had quite the all out extermination program of its neighbor to the south. Its wolf population, while bountied from the early 1900's and hunted extensively in the 1940's and 1950's, survived in relatively large numbers.

Wolf studies were conducted in several parts of Canada. I.M. Cowan conducted a study of wolves in Canada's Rocky Mountain national parks.¹ He described hunting behavior from examination of tracks in the snow. He found that while a single wolf could sometimes kill an elk, it was more usual for them to attack in a group. Even then if an elk stood its ground, the wolves sometimes gave up. They usually caught their prey after a short chase. The longest he noted was one and one half miles. Wolves preferred deer to elk, since they were less formidable prey. Big Horn sheep and mountain sheep were also less often the prey of wolves if easier targets were available. He carefully recorded sightings of the various prey species and assumed

¹Cowan, I.M., "The Timber Wolf in the Rocky Mountain National Parks of Canada," Canadian Journal of Research, Section D, 25 (October, 1947), 139-174.

their sightings should reflect their relative abundance in the area. He also noted the number of times each was represented in wolf kills and concluded: "In comparison with the number of kills recorded, deer apparently contribute to the diet in greater proportion than they are represented in the population."¹

Hard evidence began to accumulate that given a choice of prey species, wolves concentrated on the species easiest to catch. They also seemed to concentrate on species the size of beavers or larger. R.L. Peterson published a study of moose on St. Ignace Island in Lake Michigan in 1955. Again wolves would rather attack deer than moose even though moose were more numerous. He found deer remains in fifty seven per cent of seventy six wolf scats collected and moose in thirty six per cent.² Milton Stenlund also found deer remains in eighty per cent of fifty one wolf stomachs examined in a study of wolves in Northern Minnesota in 1955.³ This was an area where moose also occurred. Alexander Banfield, in a study of barren ground caribou published in 1954, found caribou remains in sixty six per cent of sixty two scats collected.⁴ Sigurd Olson's summer wolf diet of small animals was not to be corroborated by any later researchers.

¹Cowan, I. M., Op. cit., p. 164.

²Peterson, Randolph L., North American Moose (Toronto: University of Toronto Press, 1955) p. 175.

³Stenlund, Milton H., A Field Study of the Timber Wolf (Canis lupus) On the Superior National Forest, Minnesota, Technical Bulletin, No. 4 (Minneapolis, Minnesota Department of Conservation), p. 21.

⁴Mech, L. David, The Wolf (Garden City, N.Y., The Natural History Press, 1970), p.173.

Game management became synonymous with "game animal only" protection. The national parks of Canada followed a policy of protection from hunting for game animals, but wolf control was deemed necessary. Wolves were eliminated from Jasper and Banff National Parks entirely. Banfield published a report on the wolves of Prince Albert National Park in Saskatchewan in 1951.¹ Wolves had entered the area in the 1920's. The game populations had increased since the establishment of the Park in 1927, with the exception of the caribou. Good browse for this specie had been decimated as a result of forest fires. The fires tended to encourage second growth which benefitted elk, bison, and moose. White tailed and mule deer also extended their range and increased during this time. With the increased food supply, the wolf population also increased.

From 1945 to 1950 a vigorous wolf control operation including the use of snares, shooting, denning and cyanide guns reduced the wolf population in the Park from thirty eight to eighteen animals. Banfield was aware of the publication by Paul Errington in 1946 of a study on predation. Errington had suggested that population control of prey species was dependent on the interaction of several factors and that predators were only a part of the picture.² In 1950 Clifford Presnell

¹Banfield, Alexander W.F. Populations and Movements of the Saskatchewan Timber Wolf (Canis lupus knightii) in Prince Albert National Park, Saskatchewan, 1947 to 1951. Wildlife Management Bulletin, Series 1, no. 4. (Ottwa, Canadian Wildlife Service, 1951), pp. 1-24.

²Errington, Paul L., "Predation and Vertebrate Populations," Quarterly Review of Biology, 21 (September, 1946), p. 231.

presented the view that predators could not keep herbivore populations in check.¹ Banfield concluded his report with the suggestion that wolf control operations be suspended to see if the decline in wolf numbers was really due to the control measures, and to see if wolves could serve as a check on the elk and moose which were increasing to the point that some areas were being overbrowsed.² Such an experiment was tried in Canada in Algonquin Provincial Park.

¹Presnell, Clifford C., "The Predator Question -- Facts Versus Fancies." North American Wildlife Conference Proceedings, 15 (1950). 207-208.

²Banfield, Op. cit., p. 21.

V: DOUGLAS PIMLOTT AND ALGONQUIN PARK

In 1954 there was a conference in Calgary that proved very important to the wolf. The Federal-Provincial Conference on Predator Control was instrumental in ending the bounty system in the western provinces in favor of more enlightened management techniques.¹ As in the United States, Canadian provincial and local governments had tired of the money the bounty system cost, and were ready for an alternative. In Ontario, where bounties had the longest history, an agreement was reached in which the Provincial government agreed to pay as much to research wolves as it did for killing them. The purpose was to determine the influence wolves had on wildlife populations in the Province to provide a factual background from which a "judicious and efficient" program of management could be instituted.²

The research program began in 1957 and Algonquin Park was selected as the site of the initial study. J.A. Shannon, a conservation officer, was the first field researcher assigned to the project. Douglas Pimlott was the biologist, and V.H.H. Williamson and A. Fyvie carried out the laboratory work.³

Wolves had been killed in the Park from 1909 to 1958, more than twelve hundred being poisoned or snared in that time. With the advent of the study in 1959, wolf killing within the Park ceased. One of the major problems to be overcome was to find some way to inventory

¹Pimlott, Douglas H., et. al., The Ecology of the Timber Wolf in Algonquin Park. Research Report (Wildlife) no. 87. (Ontario Department of Lands and Forests, 1969) p. 5. ²Ibid. ³Ibid.

the wolf population of the Park. The first year, 1958, a method based on scent posts was devised.¹ It proved unreliable from the beginning. It was well known that wolves investigated and urinated on scent posts along the travel routes. Wolfers made use of this knowledge for years in selecting places to set their traps. The researchers decided to place artificial scent posts marked with wolf urine in places wolves were likely to travel during the winter, and count the tracks to determine how many wolves were in the area.

Some posts were set up within the Park boundaries and others were placed outside the Park in the Gogama Forest. Two different groups placed the posts. The posts in the park looked as natural as sections of a telephone pole can look, but those who placed the posts outside the Park thought it would be a good idea to place bright streamers on the pole sections to attract the wolves' attention. The results were what might be expected from a wary animal that had associated humans with death for over thirty years and was highly suspicious of anything new in its territory. When the posts within the Park were checked, wolf tracks were found on sixteen occasions. Of the thirty-five posts outside the Park not one had wolf tracks within five hundred feet, even though the posts were checked one hundred and twenty four times.

¹Pimlott, Op. cit., p. 14.

There were other problems with this method as well. Fresh snow obliterated tracks before posts could be checked, or the wind caused drifts to erase tracks. Who could tell for sure whether five wolves visited the post consecutively, or one wolf came five times? The scent post method was abandoned after the first winter.

Aerial searches were also employed that first winter with more success. A total of ninety-four hours were logged, and both wolves and wolf kills were found.¹ Algonquin Park included areas of dense cover in winter as well as open areas such as frozen lakes. Aerial surveys tended to report large groupings of wolves and to miss single animals and pairs. There was an attempt to coordinate the aerial picture with the one seen from tracks on the ground, and aerial estimates were increased twenty per cent to compensate for this tendency. It appeared four different packs were present in a density of one wolf per ten square miles.

Summer presented the researchers with its own set of difficulties. Aerial surveys were out of the question due to the dense cover. Without snow tracking animals was very difficult. How could wolves be found and counted in the summer?

The solution to the problem and the method that made this research program different from all others before it, combined technology and human ingenuity. At the Wildlife Research Station in Algonquin Park a group of timber wolves, coyotes, and coyote-dog hybrids were kept

¹Pimlott, Op. cit., p. 12.

captive for research purposes. They often howled in unison and would respond by howling if a human howled to them. In the summer of 1958 Shannon tape recorded their howling and found they would reply to the recording just as they did live human howling. R.Y. Edwards had first suggested using tape recordings in wolf research, but this first one was of poor quality and low volume. So in March of 1959 the researchers had Dr. W. W. H. Gunn make four recordings of a group consisting of three wolves, three coyotes, and one coyote-dog.¹ No one knew what kind of reaction, if any, the recordings would get from wild wolves, so all the equipment for broadcasting and recording responses was rented during the summer of 1959. The recordings were played in May and a little in July without success, although in July the captive animals replied to them. Finally on August 5th a pack of three or four wolves responded around 10 p.m.

Eventually three packs were located in this way. Two packs were designated as test groups. One was checked twenty times between August and October and the other eleven times. When the wolves responded, the researchers took compass bearings and homesites for both packs were found on the first ground search.

This method proved very satisfactory in 1959 and 1960. Of the thirty one times these first two test groups were howled at, they responded a total of twenty-six times. Twenty of the responses were to

¹Pimlott, Op. cit., p. 20.

the first playing of the tape. Unfortunately in 1961 the method was less successful. While the four packs labelled A, B, C, and D were each found by the recording method, they did not respond reliably and their whereabouts at a given time could not be predicted as a result. Over the course of the study, it became apparent that fall was the best time to elicit responses and spring and early summer were the poorest times.¹

Every later researcher who mentioned the technique paid tribute to Pimlott and his research group for developing it as an innovative way to locate wolves in summer. The curious part was that as long ago as 1891 or 92 E.J. Dillon published an article in the English Illustrated Magazine about wolf-hunting in Russia. In this article Dillon related how his host, a Russian nobleman, arranged a wolf hunt on his estate for Dillon's benefit. Dillon explained how wolves were located in this way:

...In wolf-hunting there is seldom such a thing as a sure find; you must first send out your man—usually the head huntsman -- to play the equivocal part of detective or rather agent provocateur. This he does by entering the forest and uttering a most dismally realistic howl, as if he himself had become a were-wolf and were making desperate efforts to regain his human shape and voice. As a rule the unsuspecting animal howls back a blood-curdling acknowledgement, and sometimes honors the call in person.²

¹Pimlott, Op. cit., p. 22.

²Dillon, E.J. "Wolf Hunting in Russia," English Illustrated Magazine. 9 (1891-92), 314.

Stanley Young in The Wolves of North America also mentioned the calling of wolves:

Some wolf hunters and other woodsmen become adept at imitating the various calls of the wolf. Many instances are on record of wolves having been called up to within shooting range of the hunter. Some of the Eskimos in northern Alaska, who are proficient in wolf-calling, are reported as often succeeding in thus enticing near enough to kill wolves degrading on reindeer herds.¹

Yet neither Pimlott in his description of the technique, nor other researchers who used it later ever mentioned the hunting of wolves by calling as an inspiration for the use of tape recordings. The Dillon article was not mentioned in any researcher's bibliography, so perhaps no one was familiar with it. Stanley Young's book was often cited, but since most researchers disagreed with its conclusions concerning wolf behavior, perhaps they did not believe his account of calling wolves either.

At any rate it became an established method in conjunction with ground searches to find wolves at Algonquin Park. Paul Joslin made extensive use of the technique in 1961 to keep track of a single pack throughout the summer.² He followed it from the den site through six "rendezvous sites" all within a six mile radius of the den, both by recording and howling himself. The wolves responded better to his voice than to the tapes.

¹Young, Stanley P., The Wolves of North America, p. 79.

²Pimlott, Op. cit., p. 21.

The Algonquin study was geared to determine the effect wolf predation had on prey species rather than on wolf behavior per se. Like other studies before it, it confirmed that wolves tend to take the most vulnerable prey specie. In this study deer remains occurred in eighty per cent of scats examined, moose in eight per cent, and beaver in seven per cent.¹ In the summer seventy one per cent contained fawn hair and of the moose remains eighty eight per cent were calves.² Pimlott concluded that wolves certainly had an effect on their preferred prey species, deer, but he would not commit himself to the theory that they were capable of regulating the deer population and keeping it within the carrying capacity of the browse available.³ The question remained open.

¹Pimlott, Op. cit., p. 87. ²Ibid. ³Ibid.

VI: THE QUESTION OF PREDATION

The question of predator-prey relationships proved complex. Sigurd Olson in his 1938 study of wolves in northern Minnesota found while wolves took deer in the winter, in summer they switched to grouse, mice, fish, marmots, snakes, insects, and even vegetation. Deer taken by wolves were mostly the old, the young, and the weak. Olson concluded that the majority of healthy deer in the prime of life were not affected by wolf predation.¹ Murie in Alaska in 1944 believed wolves kept Dall sheep in balance through predation on yearlings.² But Cowan in western Canada reported in 1947 that ungulates had increased even though there was no predator control program of any significance in operation. Even with an estimated wolf density of one per ten square miles in winter, not even all the animals dying of disease and malnutrition were being eliminated.³

A study by Rasmussen in 1941 seemed to be the one study which "proved" that predators could control a deer population.⁴ The Kaibab Plateau in Arizona was established as a game refuge in 1906. The estimate of deer on the Plateau at that time was around 4,000. An intensive predator control program to eliminate cougars, wolves, and coyotes was instituted, and within two decades the deer population had soared to 100,000. The area was subsequently overbrowsed by deer

¹Olson, Sigurd F., Op. cit. p. 335.

²Murie, Adolph, Op. cit., p. 143.

³Cowan, I. M., Op. cit., p. 174.

⁴Rasmussen, D. I., "Biotic Communities of Kaibab Plateau, Arizona", Ecological Monographs, 3 (July, 1941), 269.

and cattle and by the 1920's the deer herd was reduced to 10,000 by starvation. So for this area a direct causal relationship was assumed between the elimination of predators and the increase in the mule deer population.¹

Douglas Pimlott disagreed with Rasmussen. He found several extenuating circumstances which, he felt, cast doubt on Rasmussen's conclusions.² Around 1870 there were five hundred Indians living on the Plateau who took an estimated 800 deer annually. After 1885 cattle were grazed on the Plateau and Pimlott assumed that cattlemen took deer in considerable numbers. When the Plateau became a refuge in 1906, human hunting also was eliminated, and this could have had as much an effect as the elimination of predators. So the Rasmussen study results were not all that convincing, and subject to differing interpretations. The evidence of the other studies was not even as clear cut as the Rasmussen study purported to be.

Pimlott thought the evidence his study accumulated from Algonquin Park suggested that at least there wolves might have a major effect on the deer population. Still his study could not estimate how often wolves killed deer, or how much food an "average" wolf required on an "average" day. While it was evident that wolves fed heavily on fawns in summer, there was no way to tell which fawns the wolves were killing. If they killed weak or sick animals that would have died anyway, they would not affect the population. If on the other

¹Rasmussen, Op. cit. p. 269. ²Pimlott, Op. cit. p. 54.

hand, they took substantial numbers of healthy fawns that would have survived to maturity, the wolves would have made an important contribution in limiting deer numbers. Pimlott was the first to admit his study did not provide a definitive answer.¹

Several researchers provided a theoretical framework for this question of predation. Aldo Leopold in 1933 outlined five factors of predation: the density of prey population, the density of predator population, the characteristics of the prey (e.g. its reactions to the predator), the density and quality of alternative foods available to the predator, the characteristics of the predator (e.g. its food preferences, how efficiently it could attack, etc.)² Paul Errington had conducted the most extensive studies of vertebrate predation. He defined two types of predation: compensatory and noncompensatory. Compensatory predation did not affect prey population numbers because it involved predators taking animals that would die from other causes anyway. If, on the other hand, predators took healthy animals or large numbers of the young, the herd size could be substantially affected. This he called non-compensatory predation. He concluded that predators only took large numbers of prey when the prey were living in insecure situations in marginal or submarginal habitats. While he had not studied wolves himself, he thought of all

¹Pimlott, Op. cit., p. 56.

²Pimlott, Douglas H., "Wolf Predation and Ungulate Populations" American Zoologist, 7 (May, 1967), 268.

the predators the Canis genus could be involved in noncompensating predation on some occasions. He thought there were strong indications of their depressant effect on deer.¹

Errington's conclusions proved almost prophetic. He suggested that most examples of predators having a depressing effect on wild ungulates had one thing in common: the predators had special abilities as killers and were usually Canis species. He called Canis species "members of a subhuman group inferior as mammals only to man in adaptiveness and potential destructiveness to conspicuous, relatively slow-breeding forms."² Still he suggested that other factors could be more important in limiting populations, and that predation was not the most important factor in most cases. So as Pimlott insisted, predation proved to be such a complex relationship with so many variables, that very few generalizations about the influence wolves had on prey populations was possible. No study had yet shown conclusively that wolves were the primary factor limiting a prey specie. Nature, however, was about to provide a unique opportunity to address that question head on.

¹Errington, Paul L. "Predation and Vertebrate Populations," Quarterly Review of Biology, 21 (June, 1946), 158.

²Ibid.

VII: ISLE ROYALE, PART I

The question of predation was not going to find a definitive answer until an in depth study under controlled conditions could be arranged. Yet the possibility of setting up such an ideal outdoor laboratory seemed almost nil. Nature, however, provided its own, fully equipped and publicly owned, ready and waiting for the invasion of the scientists.

Its name was Isle Royale, a U.S. national park since 1940. Sometime around the turn of the century moose swam the thirteen to twenty miles of Lake Superior between the Minnesota or Canadian shore and the island, which was officially a part of Michigan. By the 1920's they had prospered and increased into one of the best known moose herds in North America. The moose found Isle Royale an ideal habitat. From timber cutting and fires years before the island provided a lot of brush and young trees. In those areas where old mature growth was left, shade tolerant American yew or ground hemlock grew underneath. It was a favorite food of the deer family. By 1926 the moose population on Isle Royale was estimated to be close to two thousand animals living on an area seventy-two kilometers long and fourteen kilometers wide at its widest point.¹ By 1936, the moose had literally eaten themselves out of house and home and there were fewer than two hundred left.² A major forest fire ravaged the

¹Allen, Durward, Wolves of Minong (Boston: Houghton, Mifflin, 1979), p. 30. ²Ibid. p. 40.

island that year, and because of it the stage was set for the cycle to renew itself. In future years there would be more browse of new growth available and the herd could increase again. By 1948 an estimated 800 moose roamed the island.

At this point there were those who suggested that something be done to prevent another wild population explosion. Since hunting was not allowed in a national park and there was bound to be a public outcry if the Park Service selectively culled large numbers of animals, Lee Smits, a newspaperman from Detroit, proposed releasing wolves on the island.¹ The Superintendent of the Park, Charles E. Shevlin, thought there might already be wild wolves on the island, and the plan was also ill advised because of probable adverse public reaction. Nevertheless Smits persevered and when no wild pups could be obtained, he settled for animals from the Detroit zoo. Four young adult wolves, Lady, Queenie, Adolph and Big Jim were brought to a wire pen at Rock Harbor, Isle Royale in 1952. One escaped and the other three were turned loose ahead of schedule because they kept getting tangled in the wire. Since they were not afraid of people, and Big Jim had been hand reared, they got into all sorts of mischief, tearing laundry from the line and terrorizing unsuspecting tourists. When attempts to retrap them failed, they were shot, except for Big Jim who became extremely wary and stayed out of range.²

¹Allen, *Op. cit.*, p. 13. ²*Ibid.*, p. 17-18.

