PROGRESS REPORT OF COYOTE STUDY IN YELLOWSTONE NATIONAL PARK

by

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In a letter dated March 25, 1937, the Regional Officer, Region 2, was requested by the Director to assign me to make a thorough study of the coyote and its relationships to other wildlife species in Yellowstone National Park. In compliance with this request I reached Yellowstone May 1 to begin field studies of the coyote and other species on which it preys. Although it has not been possible to devote all of my time to this study I feel that it has not suffered greatly as a result of other special assignments given me and that fairly good continuity in observations has been maintained. Special assignments kept me away from Yellowstone for various periods as follows:- Wind River Mountain investigation, July 26 - August 1; Flathead Forest investigation, August 8 - 22; Shoshone Forest trip, September 6 - 14. Most of October was spent in the Omaha office and December was devoted to the analyses of scats in Jackson, Wyoming.

This brief report on the coyote study is being made at the request of Mr. Cahalane, Acting Chief of the Wildlife Division, in a letter dated December 20, to Mr. Allen, Regional Director, Region 2. A copy of this letter was sent to me at Yellowstone and mis-forwarded to Moran, finally reaching me today, January 5. Since the report is wanted in Washington by the middle of January there is not time for making anything but a brief report on my findings so far. At this point in the study it is only possible to arrive at tentative condlusions since the critical winter period remains to be studied.

Methods:

In studying the role the coyote plays in the Yellowstone fauna I have first tried to learn the food habits of the coyote; what he eats and to what extent. But his food habits do not tell the whole story, for after we learn what the coyote eats it must be determined what effect he has on the prey species.

The food habits were studied by means of dropping examinations. Droppings were gathered at every opportunity in various localities in the park. Although droppings were gathered from all localities visited special effort was made to

get numbers, large enough to be significant, from critical areas. Localities selected for special study included water bird nesting habitats, and elk and antelope fawning grounds. Rather large collections of droppings were secured from the following areas: Old Faithful, Gibbon and Elk Meadows, Virginia Meadows, Swan Lake, Tower Falls, Specimen Ridge, Horseshoe, Buffalo Ranch, Hayden Valley, and Pelican Creek. Smaller collections were secured from other localities. Since food habits are likely to change with the seasons an effort was made to get representative collections of scats throughout the period during which the study has been in progress. The quantitative data on food habits secured from the examination of droppings has been supplemented some by observations on the animals in the field. Studying food habits of coyotes in an area by examinations of droppings is far superior to studying them by stomach examinations, for the latter entails the killing of the animals. Not enough stomachs could be secured in an area to give significant result. Animals shot or trapped are usually taken at baits so that the data thus obtained is not as non-selective as that represented in droppings. And it is hardly wise to shoot the very animals to be studied. Not only would killing coyotes diminish the opportunity for learning, but the conditions under which the study was being made would be constantly changing at an abnormal rate.

More difficult than learning the food habits of the coyote is the determination of the effect the coyote has on species preyed upon. Each prey species must be carefully studied to learn what effect predation is having on its numbers. In the summer and fall it is especially important to learn what proportion of the young are surviving. And if few young are surviving it is necessary to go one step farther and learn if it is the coyote or some other factor causing heavy mortality. At all seasons the prey may be carrion rather than kill, or it may be the old, decrepit or sick animals which are being eaten.

Food Habits.

About 4000 droppings were gathered between May 1 and the latter part of December. Many of these I was able to analyse in the field but the majority of them were analysed during the past month. The job has just been completed. There is not time to present this data in this report. Furthermore I do not want to present the data until there is

time for leisurely study of the results so that they may be correlated with field data, and intelligently interpreted. However I can give a general picture of the food habits from my familiarity with the data.

The field mouse (Microtus) and pocket gopher were found to be staple food items from May until the latter part of November. As many as 6 pocket gophers were found in a single droppings. This is in agreement with O. J. Murie's study of the coyote in Jackson Hole.

Grasshoppers and crickets are eaten in large quantities from the time they become available early in summer until the latter part of November when they are inactive and are found by smell or possibly sight. During this period very few ducks or geese were eaten; not enough, I am sure, to be of any significance. Calf elk showed up frequently and some antelope fawns but relatively few of the latter. Elk carcasses were available from time to time and were rapidly cleaned up. Other food items include snowshoe hare, Jackrabbit, woodchuck, ground squirrel, red squirrel, chipmunk, pack rat, white-footed mouse, jumping mouse, weasel, mink, beaver, porcupine, muskrat, fox buffalo, grouse, small birds, pine nuts, strawberries, plum, picnic lunches, butter wrappers, and garbage. Availibility of prey, which is dependent on its abundance and ease of capture, seemed to determine the species preyed upon.

The Status of Prey Species.

Antelope.

Antelope fawns are eaten during the summer by coyotes but it is not known what proportion of those eaten represent carrion. We do know that fawns of several species of big game die at birth or soon after. O. J. Murie in his publication "Food Habits of the Coyote in Jackson Hole, Wyoming" states that "calves of both elk and moose had been dying shortly after birth, and in the spring of 1931 eight dead elk calves were found" over a limited area, which had not been killed by natural enemies. In 1936, adjacent to Teton Park, I was told that there was a cow moose with two calves, one of which seemed sickly. I visited the area where the moose had been seen the following day and found the sick calf already dead. The mother was still in the vicinity so the calf had not been deserted. Ben Arnold reports finding on June 19, 1931, a dead doe antelope and two dead fawns, one born and the other still unborn, and attributed the death to trials of birth. It seems probable that some of the fawns eaten by coyote represent carrion.

Fawn counts made during the summer are not very trustworthy unless carefully checked and re-checked. At this time of year one doe might be followed by 7 or 8 fawns, a group of fawns might be off by themselves; or the does might be banded together some distance from the fawns. Although fawn counts were made during the summer, with accuracy in at least one area, this data will not be included here since more complete counts were made late in the fall.

On November 11 and 12 I made a count of antelope in the Blacktail area and the Game Ranch area, and on November 13 a few were counted above Geode Creek. The western portion of Mt. Evarts was not covered. The results of this count are as follows: Total seen 482 (not including 6 which were not classified). Of this number 137 were bucks, 187 does and yearlings, and 111 fawns. In one group of 62 the fawns were counted but the does and bucks were not separately counted so are not recorded either as does or bucks. The percentage increase in the portion of the antelope population seen is 29%.

On November 16, 17, and 18 another count was made. This time I was unable to cover the top of Mt. Evarts and its eastern slopes. Sixty-eight animals were not classified so are not included in the following figures: Total number antelope seen 388; of these 140 were bucks, 131 does and yearlings, 84 fawns. The percentage increase in this sample of the population was 27, only two points different from the percentage found in the first count. It was felt that there was practically no duplication in the counting in either case. At this time of year the fawns are sometimes not easily identified. But since I classified none as fawns unless I was certain of my identification I am sure that if I erred it was in letting some fawns escape unnoticed. In fact on at least two occasions opportunity for closer scrutiny showed that I had at first missed a fawn or two.

With almost a 30% increase in fawns the status of the antelope up to the latter part of November seems satisfactory.

However there is another angle besides the coyote and its depredation to be considered in any discussion of the future of the antelope for the winter range of the antelope is in a deplorable state and each year it is apparently getting worse. The deterioration resulting from overgrazing was augmented in recent years by drought. The grasses have become

sparser but perhaps even more serious is the condition of the sagebrush which forms the staple winter diet of the antelope. The sagebrush has been killed off over wide areas in this range and what is still alive is closely browsed. The range is not holding up under the heavy usage it is receiving from antelope and the elk. We still have an over-population of game animals in Yellowstone with which to contend. An increase in the antelope herd at this time would only increase the deterioration of the range.

Bighorn Sheep.

On Mt. Washburn on July 22, 1937 a total of 57 sheep were seen which I classified as follows;- young rams 7, ewes 21, yearlings 10, lambs 19. A good proportion of the lambs had survived at least the early hazards.

During the latter part of November, at Mt. Evarts Specimen Ridge and Junction Butte, bighorns, sonsisting of ewes, yearlings and lambs were classified. There were 30 ewes, 15 yearlings, and 13 lambs. During November the bighorns were moving around so much in returning to their winter range it was difficult to get counts on many of them. When I return to Yellowstone during January I hope to make a rather complete census. Only a few coyote droppings were found on the summer range on Mt. Washburn and in these no sheep remains were found.

At Junction Butte and vicinity Ranger Dave Condon informed me that of 32 ewes and 28 lambs that spent last winter there, only one lamb was lost.

The bighorn is probably relatively safe from coyote atta ck as long as food is available in close proximity to cliffs. The lamb crop as now known is not alarmingly low, but studies during the winter are needed to show its exact status.

Mule Deer

The status of the deer over most of the park seems to be good. During May, 42 does and yearlings were definitely identified. Of these 42 animals, 23 were does and 19 were yearlings. Eighteen of these animals were seen along the Yellowstone River between Hellroaring Station and Lower Blacktail cabin, an area famous for coyote depredation on deer. This is a rather small sample of the population but so far as it goes it indicates a high survival of fawns last winter.

During November fawns and does seen were tabulated whenever an accurate identification of the fawns could be made and the whole group seen. The deer tabulated were seen at the Game Ranch, Mammoth, above Mammoth terraces, along Yellowstone River below Hellroaring Creek, Junction Butte, and Tower Falls. There was not much duplication in deer tabulated. Of 114 deer tabulated, 62 were does and yearlings, and 52 were fawns.

No deer fawn was found in any coyote droppings. Deer are found over such a large territory in summer that even though the coyotes preyed on some fawns the chances for finding remains in the droppings would not be as likely in an area as it would if the deer were more concentrated. The high fawn survival indicates that few fawns died or were eaten by coyotes.

Elk.

The data secured from droppings shows that the coyotes feed on a considerable number of elk calves. Many calf remains were also found in the field. Here again it is not known what proportion of the elk calves are carrion and how many are killed by the coyotes. It would very be very desirable to make an intensive study of this phase of the coyotes food habits.

During November whenever a whole herd could be seen I counted the calves and the cows and yearlings. In this way I classified 577 elk. There were 408 cows and yearlings and 169 calves. The percentage increase, not including bulls as part of the herd, is here 41%. Counts made by William Rush in Yellowstone back in 1928 to 1931, during January, February, March and April showed an average increase of about 24%. Calf mortality is high during the winter especially during the latter part of the winter so that the lower percentage he obtained in his counts is no doubt largely due to this factor. However, although the figures are only roughly comparable, the indication is that the calf elk survival is as high now as it was back in the days when coyote control was practiced.

At the present time it seems that elk are prospering well, in fact too well for the good of the winter range and other big game species using this range.

Waterfowl.

Depredation on waterfowl during the nesting season is not serious according to data secured from examination of droppings and from field observations. It has been reported that in

some sections where ducks are wintering there is considerable coyote predation.

The best check I could make on geese indicated that many broods hatched out. Even at the Buffalo Ranch where there is an unusual concentration of coyotes I found six families along the Lamar River. Adult geese are taken occasionally but their wariness usually protects them from the coyote. Several times I have watched coyotes hunting mice in close proximity to geese feeding in meadows without paying any attention to the geese. However the geese are alert and keep a close watch as long as the coyote is near them.

The trumpeter swans had their best season thus far recorded. Twenty-nine cygnets survived through the summer and so far as known none were taken by predators. Some of the swans nested on shore where they were subject to coyote attack yet none of the nests were molested. At Trumpeter Lake where seven cygnets were raised, I found numerous coyote tracks in the mud around the lake. Nineteen of thirty coyote droppings picked up at the lake contained nothing but grasshoppers, and the others, except one, elk, pocket gopher, and Microtus. The only evidence of waterfowl predation consisted of remains of a greenwinged teal on the bank and in one dropping. The swans spent considerable time resting on the bank but apparently were well able to protect themselves from the coyotes which prowled in the neighborhood.

Waterfowl depredation up to the latter part of November was not severe.

Blue Grouse and Ruffed Grouse.

Some grouse are eaten but not enough to bring about any serious reduction in their numbers. I found both species of grouse more abundant than I have found them south of the park in the Teton National Forest. Several of the grouse eaten were definitely determined to be carrion.

Other Species.

The exact effect of predation on rodents and other smaller species is hard to determine. The pocket gophers and field mice probably recover from the heavy predation exerted on them by coyotes because of the resilience these species possess as a result of their prolificness. Other species preyed upon seem to be holding their own.

Status of Predators in Yellowstone Park.

Several predators formerly part of the Yellowstone fauna are now extremely scarce or absent. These include the wolf, cougar, lynx, and wolverine. The absence or scarcity of these predators leaves a larger niche for the coyote to fill. Since predators over the country as a whole are being unreasonably persecuted the Park Service should be specially concerned with them and try to bring back some of the native predators which are now so extremely rare in Yellowstone.

Coyote Movements.

Very little is known in detail concerning the migration of coyotes. Some have said that Yellowstone coyotes "infest" the surrounding country. To what extent they do is not known. There probably is some movement of coyotes out of the park in the immediate vicinity of the Gardiner area for the habitat unit here includes non-park lands. Last summer I had opportunity to visit the North Fork of the Shoshone river, an area which Yellowstone coyotes are said to populate in winter. The large number of droppings seen on the trails indicated that this area had its own large summer population of coyotes so that it is doubtful whether or not a great many Yellowstone coyotes move into this area. The heavy game concentrations in Yellowstone with the resulting large amount of carrion probably tends to hold the coyotes within the park during the winter months.

Coyote Mortality.

The control of populations brings up a difficult subject. According to mathematics most any species could flood the world in a short time if it were not checked. What are the checks? In Yellowstone it seems that the coyotes are not multiplying according to mathematical expectations although the next year or two , if no control should be practiced, will give us more definite information on this.

All coyotes in Yellowstone are not surviving. During February 1937 Ranger Dave Condon at Tower Falls found three coyotes which were so weak that he was able to run them down within a distance of 60 yards. Two of them died before they could be taken to Mammoth and the third was killed in Mammoth for study. These coyotes were thought to have been starving for they were little more than skin and bones. Although the coyotes were relatively free from parasites they may possibly have been suffering from some disease. These coyotes were captured but a short distance from Junction Butte where 27 out of 28 lambs, according to Condon, wintered successfully.

I have records of 6 or 7 other coyotes which had died during the winter.

In the November-December 1937 issue of Yellowstone Nature Notes, Junior Naturalist Frank Oberhansley reports seeing a coyote which he thought might have had distemper. The coyote was in such a weakened condition that Oberhansley was able to run it down on foot. During September I saw a coyote which kept shaking his head and then his entire body while I watched him hunting grasshoppers. Something seemed to be ailing him. There may be a greater mortality of coyotes than we realize; the facts are still to be found.

Discussion.

At this point in the coyote studies no emergency has been found to exist; there seems to be no cause for alarm. The food habits as determined from the analyses of droppings are favorable to the coyote and the status of the larger game species preyed upon by coyotes is good. No undue decrease of any species has been traceable to the activities of the coyote. However it is planned to get more detailed information on all phases of the problem during the winter and keep familiar with developments. This is necessary before we can arrive at a true evaluation of the situation.