SPECIAL REPORT ON THE DEER PROBLEM IN ZION NATIONAL PARK

by

E. Lowell Sumner, Jr.
Wildlife Technician

Submitted December 11, 1937

E. Lowell Sumner, Jr.
Wildlife Technician

ZION

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December 14, 1937

The Director
National Park Service
Washington, D.C.

Subject: Special Report on Deer Problem in Zion National Park

Dear Mr. Director:

Reference is made to a letter dated November 24 from Superintendent P. P. Patraw to the Director on the above subject in which the serious nature of the deer problem in Zion Canyon is described. In a letter to the Regional Director dated August 17, 1937, Superintendent Patraw requested that a wildlife technician visit the area to make a study with recommendations.

The special report enclosed herewith summarizes the findings of Wildlife Technician E. Lowell Sumner Jr., who investigated the problem in response to the above mentioned request.

The Wildlife Division has expressed the hope that the Service will be able to secure the badly needed authorization to dispose of surplus animals which it tried unsuccessfully to obtain last year. It is felt that the case of Zion National Park furnishes ample evidence of the need of this authorization.

Sincerely yours

ELS/J

Frank A. Kittredge
Regional Director

cc:
Encl. 1569635

Regional Office - Region IV
December 14, 1937

Memorandum to: Regional Director

Subject: Special Report on Deer Problem in Zion National Park

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Accordingly the writer spend the period from November 17 to November 20 investigating conditions, and the findings comprise the body of the report which is transmitted herewith.

It is hoped that the Service will be able to secure the badly needed authorization to dispose of the suplus animals which it tried unsuccessfully to obtain last year. It is felt that the case of Zion National Park furnishes ample evidence of the need of this authorization.

E. Lowell Summer Jr.
Wildlife Technician

Encl. 1569636

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
ECW REGION FOUR
601 SHELDON BUILDING
SAN FRANCISCO, CALIFORNIA

December 14, 1937

The Superintendent
Zion National Park
Utah

Subject: Special Report on the Deer Problem, Zion National Park

Dear Sir:

Reference is made to your letter of August 17, 1937 in which you requested that a wildlife technician visit Zion National Park to make a study with recommendations of the serious overpopulation of deer on the floor of the canyon.

We enclose herewith two copies of a special report on the above subject which was prepared following a study made on the ground by Wildlife Technician H. Lowell Sumner Jr. It will be noted that the Wildlife Division shares your belief as to the seriousness of the situation as outlined in your letter to the Director dated November 24, 1937. We sincerely hope that some practical scheme can be worked out in cooperation with the State Fish and Game Commission whereby the surplus deer can be utilized by needy persons, for it seems logical and desirable that surplus animals originating within the national parks should give the maximum benefit to the communities surrounding these protected areas. We shall appreciate hearing as to what progress you are able to make toward the solution of this problem.

Sincerely yours

Frank A. Kittredge
Regional Director

Encl. 1569637

SPECIAL REPORT ON THE DEER PROBLEM
IN
ZION NATIONAL PARK
By
E. Lowell Sumner Jr.
Wildlife Technician

INTRODUCTION

In a letter to the Regional Director dated August 17, 1937, a request was made by the Zion National Park administration that a wildlife technician visit the area to make a study, with recommendations, of the serious over-population of deer on the floor of Zion Canyon. Accordingly, the writer spent the period from November 17 to November 20 investigating conditions on the ground, and the findings comprise the body of this report.

Subsequent to this field study Superintendent Patraw wrote to the Director on November 24 again outlining the serious situation at Zion and inclosing with his letter the following material, which accurately summarizes the long-time observations of the park personnel concerning the deer problem:

> Memorandum from Park Naturalist C. C. Presnall to the Superintendent, dated November 23, 1937.
>
> Letter from Chief Ranger D. J. Jolley to the Superintendent, dated November 6, 1937, with 5 photographs of range conditions.

Unfortunately, Superintendent Patraw was not in the park at the time of my visit, but Assistant Superintendent Thomas C. Parker and Park Naturalist C. C. Presnall were most helpful during the field study here described, and it is certain that the work could not have been carried out in anything like the time devoted to it without their assistance.

PRESENT STATUS OF THE DEER PROBLEM

Topography in Relation to Deer Populations

A. The Canyon.

Zion Canyon is a narrow gorge which winds for nearly twenty miles between towering red rock walls 2600 to 3800 feet in height. At the upper end this gorge is hardly more than a deep crack in the earth's red crust through which the Mukuntuweap River rushes, between walls which in places are only a few feet apart. But as one proceeds down stream the canyon widens and becomes wooded, until at its mouth, where the river debouches upon the desert,

the walls are nearly a mile apart. Throughout the entire length of the canyon, however, the nearly vertical, rocky walls rise as a formidable barrier to the progress of most forms of wildlife other than birds (Fig. 1), and this circumstance, together with man's interference ~~of~~ with the original balance, is responsible for the current deer problem. The floor of the canyon (and its tributaries) included within the boundaries of the national park comprises about 830 acres of nearly level grass land and deciduous forest, at an elevation of 4000 to 4400 feet, together with about 4000 acres of much steeper ground at the base of the cliffs, which is clothed with chaparral, junipers and pinyon pines.

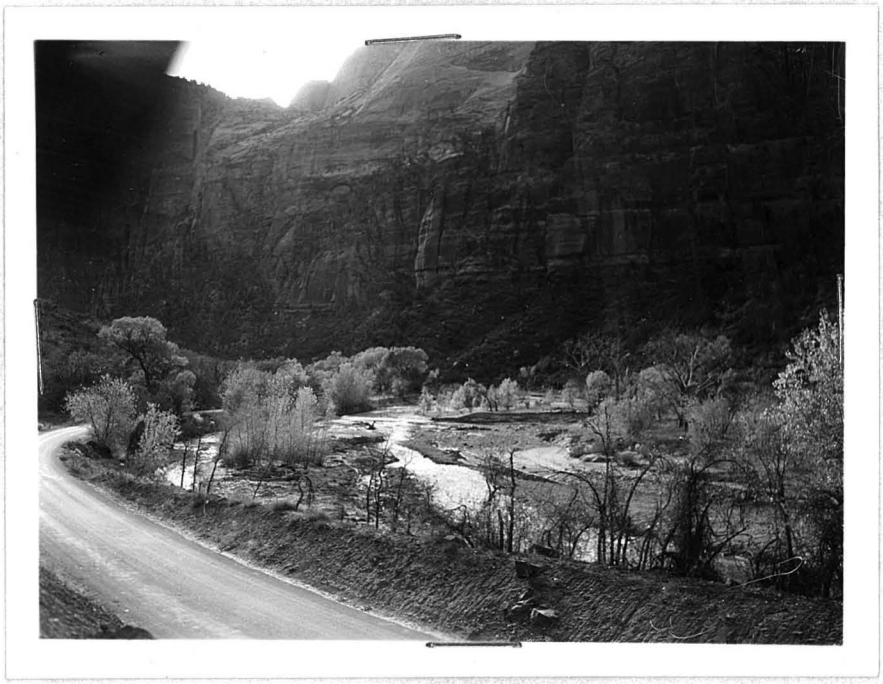

Fig. 1. View of Zion Canyon looking south from near the Organ. The nearly vertical, rocky walls rise as a formidable barrier to most forms of wildlife other than birds

B. The Mesas.

In addition to Zion Canyon, Zion National Park includes approximately 145 s uare miles of cool, Transition Zone plateau, covered with chaparral and yellow pine forest, at an elevation of 6500 to 7500 feet.

This plateau area, however, is not isolated, but extends northward, and to some extent eastward and westward, over many hundreds of s uare miles. For this reason park deer living on the plateau are not unduly numerous, for the rigors of the climate force them to move across the park boundaries into unprotected lands, so that their numbers are thinned by hunters, as well as by resident predators to some extent. The plateau area is considered in this report only as it affords a comparison with the abnormal condition on the floor of the canyon.

Numbers and Condition of Animals

A. Numbers.

As one travels on the floor of Zion Canyon deer are to be seen in twos and threes almost everywhere, especially where forest cover and dense brush are thickest. They are especially numerous in the upper, narrower end of the canyon, partly, it would seem, because the cooler, moister habitat there favors better vegetation development, and partly because, with less human development at the upper end, they are freer from intrusion. As a result of numerous careful counts made over a period of three years, Mr. Fresnall and Mr. Jolley estimate that about 200 deer are now living permanently in Zion Canyon, which represents a concentration of 1 deer per 24 acres. In addition, about 100 additional deer make their way down into the canyon from the surrounding plateaus during the fall months, so that the winter population is about 300 head, or only 16 acres per deer--at the very season when the food supply is at a minimum and the range is least able to stand this additional pressure.

Carrying capacity of adjacent range lands is estimated at 45 acres for 1 sheep (per year), according to Mr. Fresnall, and although a deer may possibly find more forage per acre because of its ability to browse higher, this advantage should be discounted for present purposes because the sheep figures are based on nearly the maximum carrying capacity of the range, whereas it is necessary for the National Park Service to adopt a more conservative basis of estimating carrying capacity in order to preserve the range in its natural, primitiv e condition.

In view of these considerations, then, it may be estimated that the proper concentration of deer in a normal (i.e. not over-browsed) area like Zion Canyon would be 1 deer to not less than 50 acres. Thus is will be seen that the present concentration of deer during the winter months is about three times what it ought to be even if the range were normal, which it certainly is not. Moreover, the prospect is that unless a severe winter kills off large numbers of the animals through starvation (as happened last year) the concentration will be even greater next year.

B. Condition.

Although the species in uestion is the Rocky Mountain Mule Deer (Odocoileus hemionus hemionus), which is typically a deer of large size, with a weight not infre uently exceeding 400 lbs., the individuals permanently

residing in Zion Canyon are so noticeably under-sized as a result of chronic malnutrition that even the visitors tend to comment on their smallness. At the time of this study the early autumn food supply was at its height, and under normal conditions should have resulted in a population of sleek, fat deer of all ages. Actually, however, only a few old bucks, which had attained mature growth in previous years, were even reasonably fat, while all the does and fawns seen were surprisingly scrawny and rough-coated for this time of the year. Mr. Presnall states that there was an unusual number of deaths from parturition this spring, as well as a heavy winter kill and conditions now seem ideal for a severe outbreak of disease if an infection should ever become established in the area.

Condition of the Range

A. In Zion Canyon.

Mr. Presnall's memorandum of November 23 (referred to above) summarizes the serious plight of native vegetation in Zion Canyon. I was told that five years ago a visiting State Fish and Game Commission characterized the Zion Canyon deer environment as a "starvation range". Certainly at the present time the ecological stratum inhabited by the deer (ground level to up to 5-6 feet) is becoming a desert of leafless, pruned back twigs, whose every leaf is devoured almost as soon as it appears by the bands of hungry animals. The "deer-line", or barren stratum of denuded vegetation, is so conspicuous on the canyon floor that one might almost imagine that the area had been flooded to a height of five feet, with the drowning out of every green leaf up to that level (Figs. 2, 3, 8, 9, 11, 13, 16).

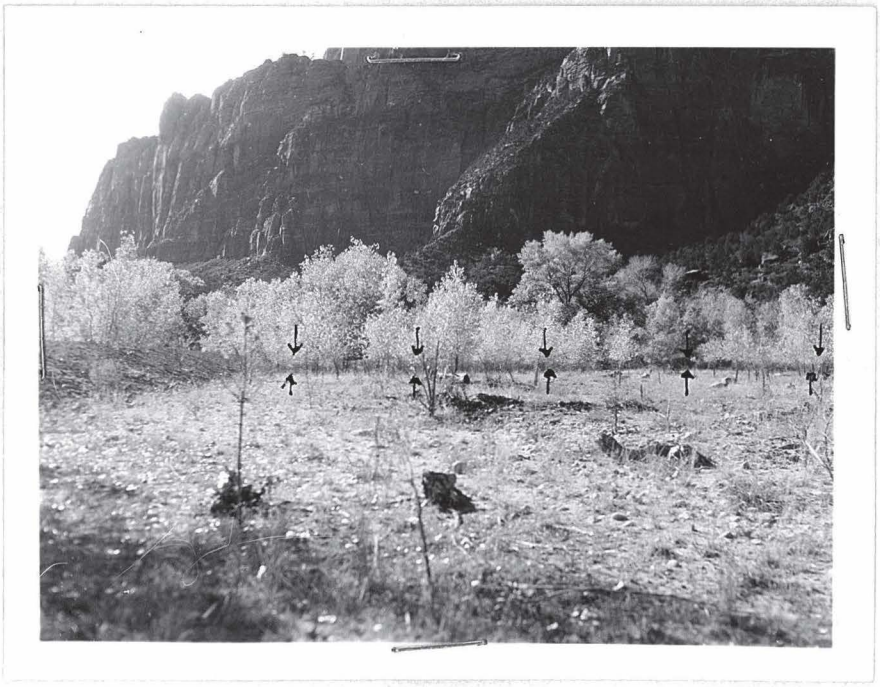

Fig. 2. The deer-line caused by serious over-browsing, as seen in cottonwoods 1/2 mile above the Lodge.

Fig. 3. The deer line in willows and cottonwoods at the Wiley Retreat. In comparison with the zone of foliage higher up, this denuded zone is almost transparent.

Among the conspicuous trees only the Box Elder (Acer negundo) has been noticeably spared (Fig. 4), although the Desert Ash (Fraxinus velutina coriacea) has also been browsed relatively slightly. Naturally, these two species cannot be used as deer range indicators, and the fact that they show no defoliation affords no clue as to the actual condition of the range. The same may also be said of the numerous grassy areas which occur on the floor of the canyon, for the deer feed on grass to an important degree only during a short period in the spring, while during the rest of the year its palatability (and nutritional value to the animals?) is evidently very slight (Fig. 5).

Plant Species Most Affected. Observations on the types of vegetation most affected by the deer famine were made chiefly in the main Zion Canyon and in Birch Creek canyon, but Oak Creek canyon was also briefly explored. The status of various plants—listed very roughly in order of decreasing palatability and utilization—is given in the tabular summary below; destruction of the less palatable species is, of course, most significant; doubtless Mr. Presnall can add other species to the list:

Species	Degree of Destruction	Illustration	Remarks
Arizona Grape (Vitis arizonica)	Leaves completely gone within reach of deer.	Figs. 1 & 3 of Mr. Jolley's report.	Mr. Presnall says that this is a favorite deer food, so that it would show some damage even under normal conditions.

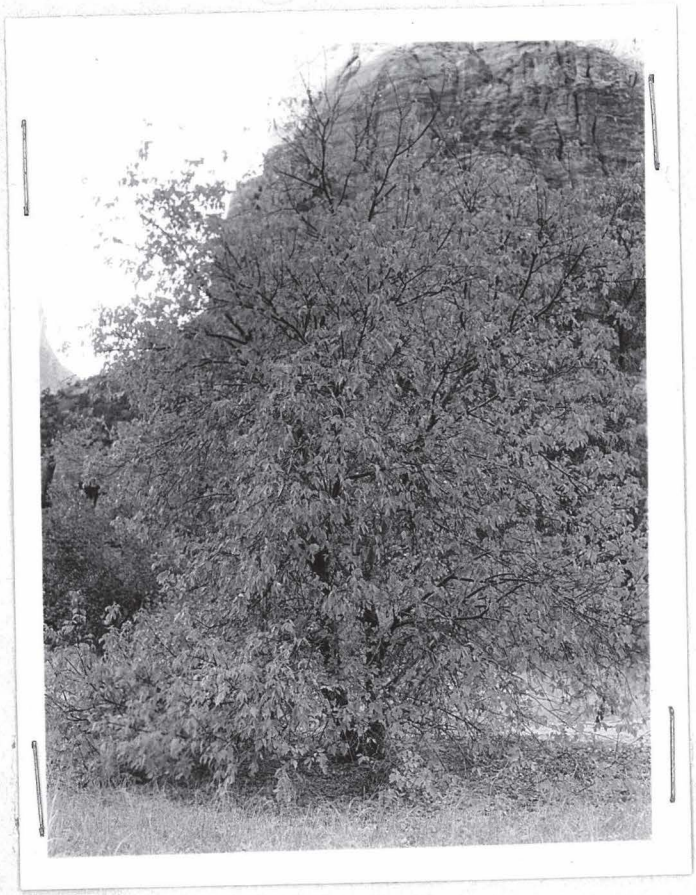

Fig. 4. Box Elder an unpalatable species the condition of which, for this reason, affords no clue as to the actual condition of the deer range. Photo taken at Wiley Retreat.

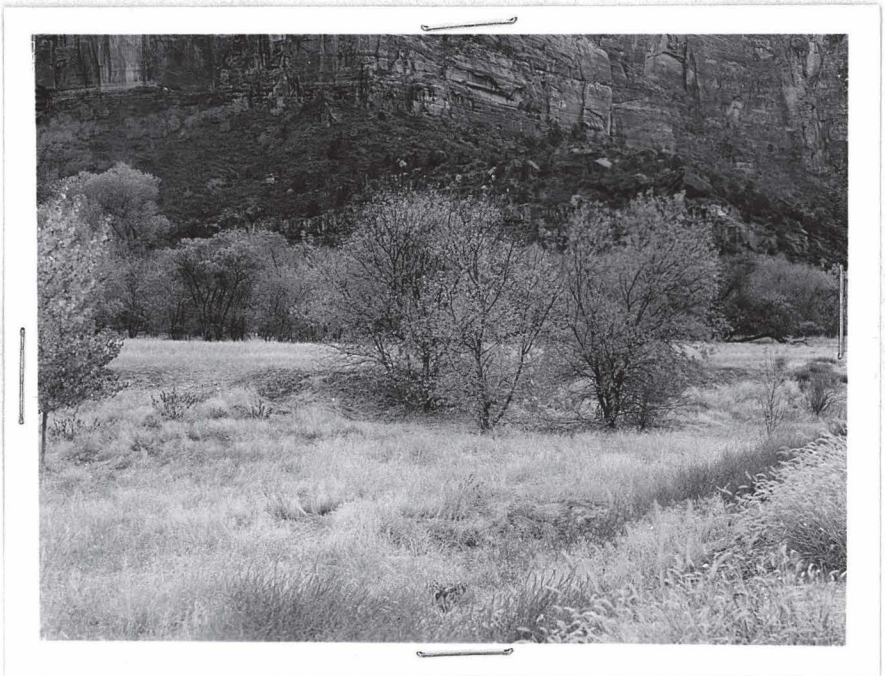

Fig. 5. Grassy meadow, with Box Elders, at the Wiley Retreat. Since deer feed on grass to an important degree only during spring (when its palatability is evidently greater), the presence of grassy areas affords no indication as to the state of the range.

Species	Degree of Destruction	Illustration	Remarks
Hackberry (Celtis reticulata)	Leaves completely gone within reach of deer, and twigs pruned back extensively.	Fig. 6, present report.	Rather common small tree.
Squawbush (Rhus utahensis, and R. trilobata?)	Leaves completely gone, and twigs pruned back so heavily as to appear clipped by a hedge trimmer. Many large bushes nearly dead.	Fig. 7, present report.	This common low-growing species cannot escape the deer attack and its future seems dubious.
Ailanthus (Ailanthus altissima)	All leaves stripped off to a height of nearly 6', and lower branchlets chewed back to stubby bases.	Fig. 8, present report.	An exotic species, found at the southern edge of the park.
Southwestern Locust (Robinea neo-mexicana luxurians)	Stripped of its leaves, in spite of thorny twigs, to a height of 5-6 ft., evidently a favorite food plant.		
Rocky Mountain White Oak (Quercus utahensis)	Leaves stripped as high as deer can reach and branchlets chewed back to stubs; reproduction of seedlings rendered impossible.	Figs. 9, 10, present report.	Compare with conditions on the mesa above the canyon, as described below.
Cottonwood (Populus fremontii pubescens)	All leaves stripped off to a height of 5-6 ft.	Fig. 2, present report.	
Sandbar Willow (Salix exigua)	All leaves stripped off to a height of 5-6 ft. and twigs chewed back.	Fig. 11, present report.	
Black Willow and related willows of tree size (Salix sp.)	Chewed back as in the Sandbar Willow.	Fig. 5, this report.	The deer line is particularly conspicuous in the the close-growing willows and cottonwoods.
Saltbush (Atriplex canescens)	In some cases every leaf has been eaten, and the bushes resemble clipped hedges.	Fig.12, this report.	This low-growing species cannot escape the deer attacks by extending above the deer line.

Species	Degree of Destruction	Illustration	Remarks
Manzanita (Arctostophylos platyphylla)	Pruned back as high as the deer can reach. Many plants appear nearly dead.	Fig. 13, this report.	Mr. Presnall says that under normal conditions of browsing, as on the mesas(see below, this species is very little eaten by deer, so that its destructions in Zion Canyon seems especially significant.
Live Oak (Quercus undulata)	Young sprouts pruned back heavily, in Birch Creek, so that they resemble hedges.	- - -	This is not considered a very palatable species.
Arrowwood (Pluchea sericea)	In most areas not touched, but near the Organ considerably pruned.	Fig. 14, this report.	This is apparently an unpalatable species, and its use indicates a food shortage.

Species little or not at all affected: Mountain Mahogany (Cercocarpus montanus), Service Berry (Amelanchier sp.), Desert Ash (Fraxinus velutina coriacea), Box Elder (Acer negundo), grass (all species).

Fig. 6. Hackberry tree bent horizontally (by the snows?) and showing all leaves gone within reach of deer. Photo taken near the Organ.

Fig. 7. This leafless, heavily pruned Squawbush is nearly dead as a result of deer attack, and its aspect bears little resemblance to that of a normal bush. Photo taken in Birch Creek.

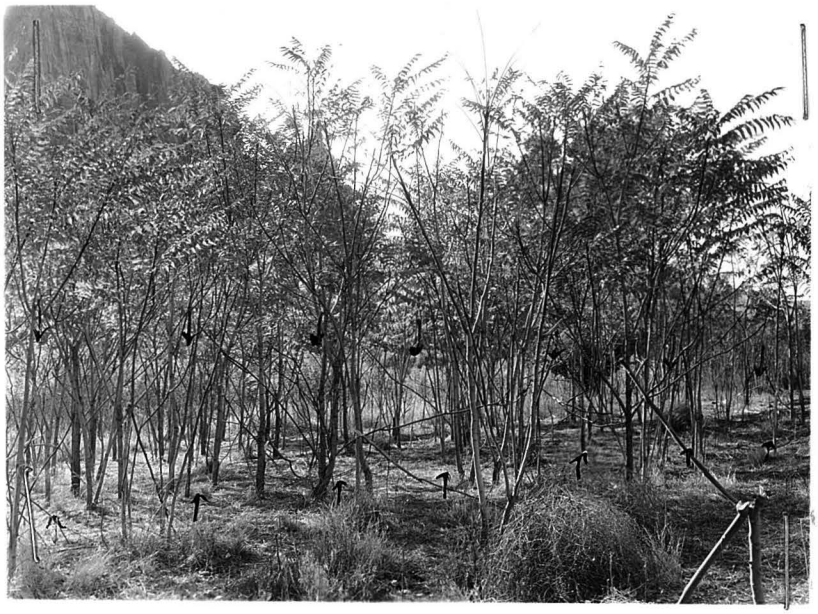

Fig. 8. The exotic Ailanthus which occurs near the south boundary of the park. All leaves have been stripped off to a height of 5-6 feet, and branchlets have been pruned back, resulting in a prominent deer line.

Fig. 9. Deer line shown on Rocky Mountain White Oak 1/2 mile above the Lodge.

Fig. 10. Young shoots ofRocky Mountain White Oak which have been pruned off as though with hedge trimmers. Such abnormal browsing is preventing reproduction of many species in Zion Canyon. Photo taken near the mouth of Birch Creek.

Fig. 11. Deer line in Sandbar Willows opposite Wiley Retreat. No leaves remain below a height of 5-6 ft.

Fig. 12. Saltbush in Birch Creek canyon, nearly dead as a result of heavy pruning by deer.

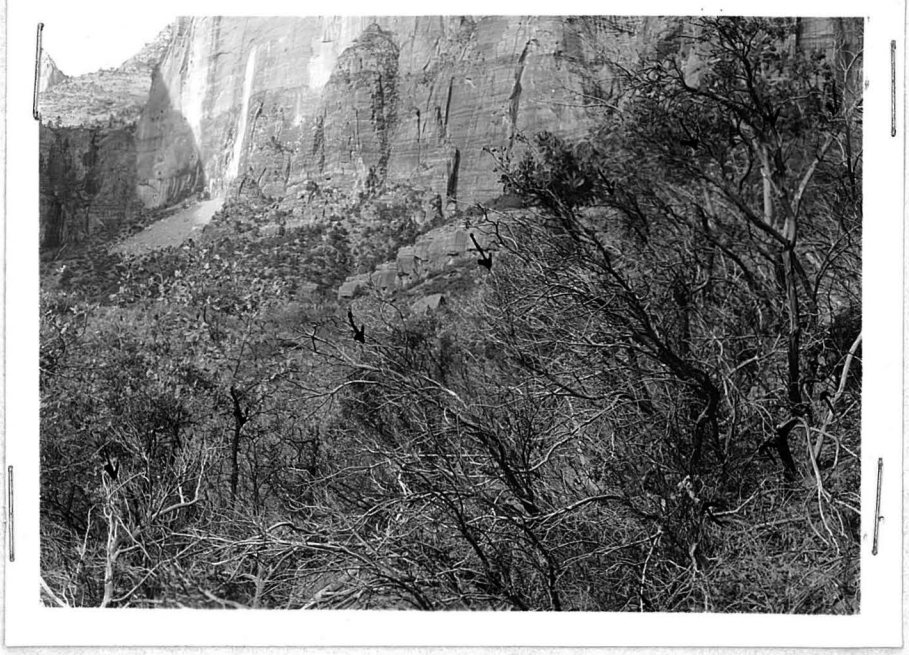

Fig. 13. Manzanita, a relatively unpalatable species in the Zion area, nearly dead from overbrowsing by deer. Photo taken in Birch Creek canyon.

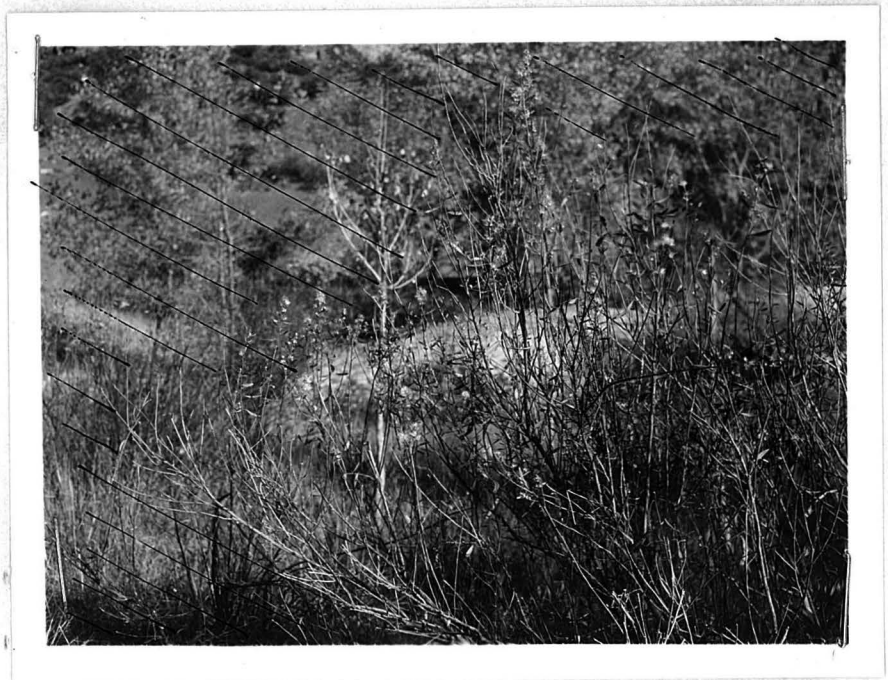

Fig. 14. Arrowwood (immediate foreground and right half of picture), a relatively unpalatable food plant, stripped of its leaves by famine-pressed deer. Photo taken near the Organ.

B. Inside The Check-Plots.

Two fenced check plots were erected in Zion Canyon during a former work period by CCC labor, and the protected vegetation inside of these is in striking contrast to the deer-pruned plants immediately outside.

Fig. 15 shows the interior of the "Willow Quadrat" opposite Arch Mountain. The recovery of Sandbar Willow close to the ground is particularly noticeable. Fig. 16 shows the denuded cottonwoods and willows just outside the quadrat. The deer line in the background is plainly visible.

C. On The Plateau Above Zion Canyon.

One day was spent with Mr. Presnall and Wildlife Ranger Fred Fagergren on the East Rim (elevation 6800-6900 ft.) above Zion Canyon. Since the deer in this area are not isolated, are hunted on adjacent private lands, are controlled to some extent by predators, and are forced to migrate during the height of the winter season, there is no overpopulation, and the vegetation shows only slight traces of browsing. Unfortunately the winter season was further advanced on this plateau than in the depths of Zion Canyon at the time of our visit, and practically all of the leaves had dropped from the trees with the result that the absence of a deer line cannot be demonstrated as clearly by photographs as would otherwise have been the case. However, Fig. 17 shows fairly clearly that the stands of Rocky Mountain White Oak have not been browsed back, even near the ground, and this is further indicated by Fig. 18, which gives a closer view of the same young trees, and shows an abundance of untouched buds on the twigs, and many leaves, withered by autumn but not stripped away by the deer.

Relation of Vegetation Destruction to Erosion Control

Due partly to accellerated flow resulting from impaired watershed storage on lands outside the park, but partly also to natural conditions, the Mukuntuweap River has at times shifted its banks considerably and has caused some erosion of the canyon floor. In an effort to control this, the park administration has devoted a large amount of energy to riprapping the banks and has tried to confine the stream to a definite channel by the construction of artificial gravel bars (Fig. 19). To insure the permanence of this work, however, it would be desirable to encourage establishment of willows and cottonwoods along the stream bank--yet this establishment of a natural means of confining the stream is rendered almost impossible at present because the deer are preventing the growth of seedlings.

CAUSES OF DEER OVER-ABUNDANCE

A. Predators

The country surrounding Zion National Park is grazed by large numbers of live stock and for this reason predators are at a low ebb even on the mesa. Wolves, originally common, must now be extinct or practically so; coyotes are rare and must seldom enter the canyon itself; cougars are present

Fig. 15. Interior of experimental deer range quadrat. Note marked recovery of Sandbar Willows near the ground.

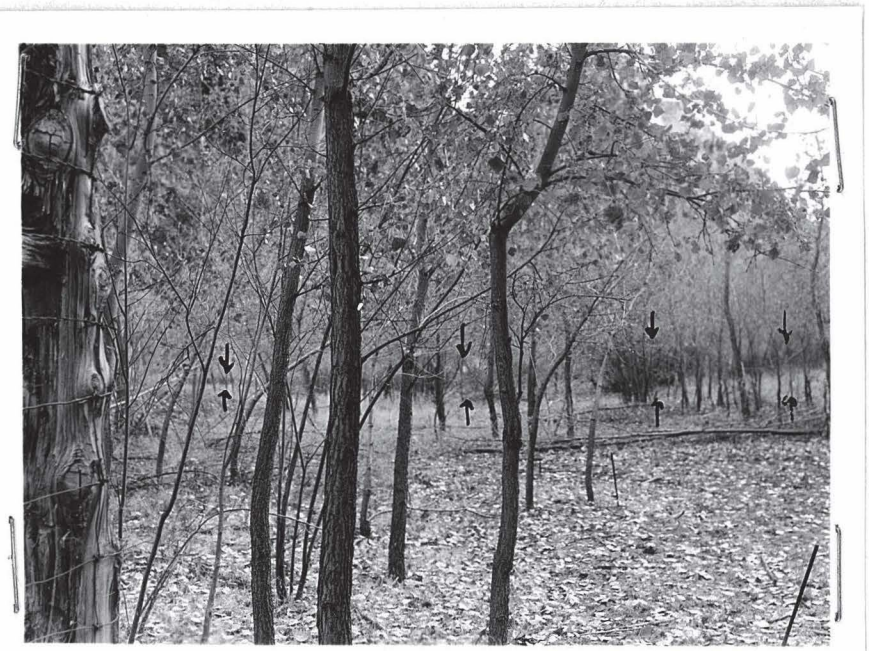

Fig. 16. View of denuded willows and cottonwoods (close up) just outside the quadrat pictured above. The characteristic Zion Canyon deer line is visible in the background.

Fig. 17. Rocky Mountain White Oak in normal deer range, showing absence of heavy pruning close to the ground. Photo taken on the East Rim, near the old sawmill.

Fig. 18. Closer view of the unbrowsed Rocky Mountain White Oak shown above. Note abundance of untouched, buds on the twigs. The remnants of many leaves, withered by autumn but not eaten by deer, can also be seen.

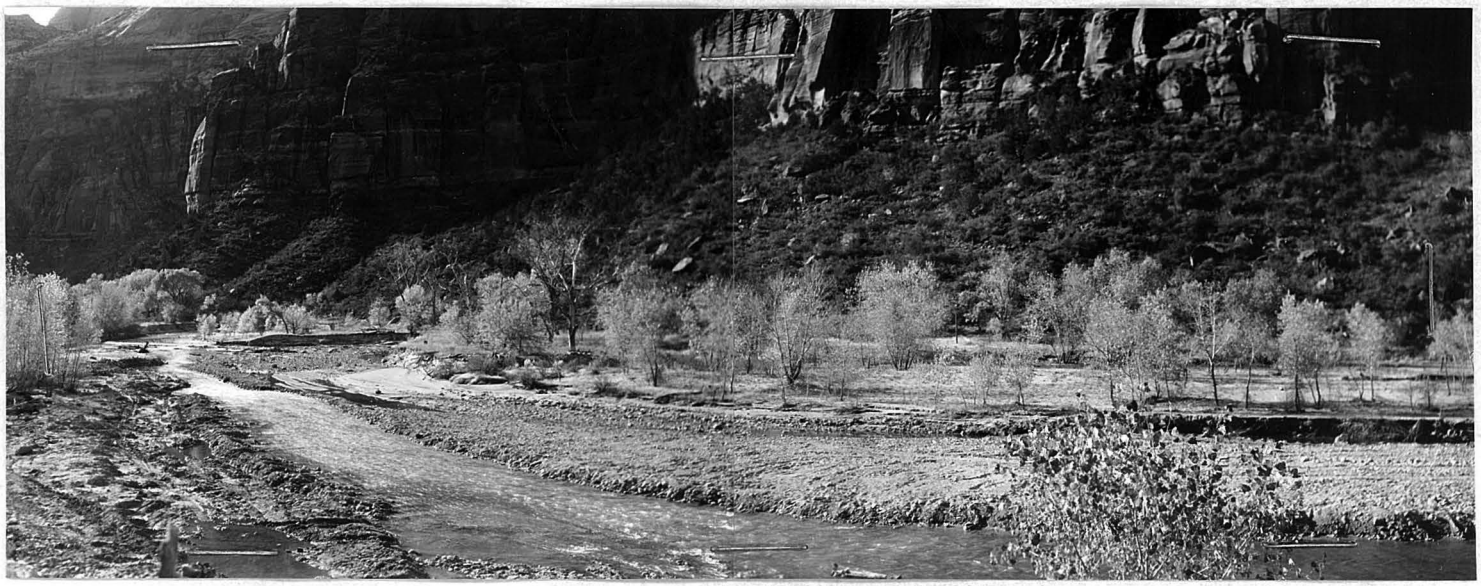

Fig. 19. Stream revetment operations in the vicinity of the Organ. To insure the permanence of this work it would be desirable to encourage establishment of willows and cottonwoods along the stream bank, yet this establishment is almost impossible because the deer prevent the growth of seedlings.

in the general region, but because of human developments would scarcely venture into the confines of the canyon often enough to exert any practical effect upon the deer. The bobcat would scarcely be an important enemy of the deer even if it were present in the canyon in appreciable numbers.

B. Natural Barriers.

As previously mentioned, the towering rock walls of the canyon constitute a formidable barrier for the deer, thus checking their dispersal to other regions. Moreover, because of the generally mild winter climate in the depths of the canyon, there is little tendency to migrate. A few of the deer which live near the mouth of the canyon do wander down stream into private holdings where they can be shot, but a restricting factor in this area is the widening of the river bottom into a level, rather open plain, with relatively little protective cover. Moreover, it is just at this point that human developments attain a maximum, with the CCC camp and the public utility operator's buildings occupying much of the tree area available (Fig. 20.)

To be sure, a number of the bolder deer are accustomed to wander past the cabins and through the parking areas in their quest for food, but it is suspected that the majority of less venturesome individuals are reluctant to run this gauntlet unless forced to do it. Whether the responsible factor is this reluctance, or a natural disinclination to abandon the home range, the fact remains that most of the deer, especially in the upper reaches of the canyon, seem to prefer semi-starvation to an exodus into the unfamiliar and in some ways less favorable territory outside the park. A further complicating factor is the fact that the open season on deer extends only from October 20 to October 30, whereas the deer would seldom be forced out of the canyon, even in a severe winter, until much later than that.

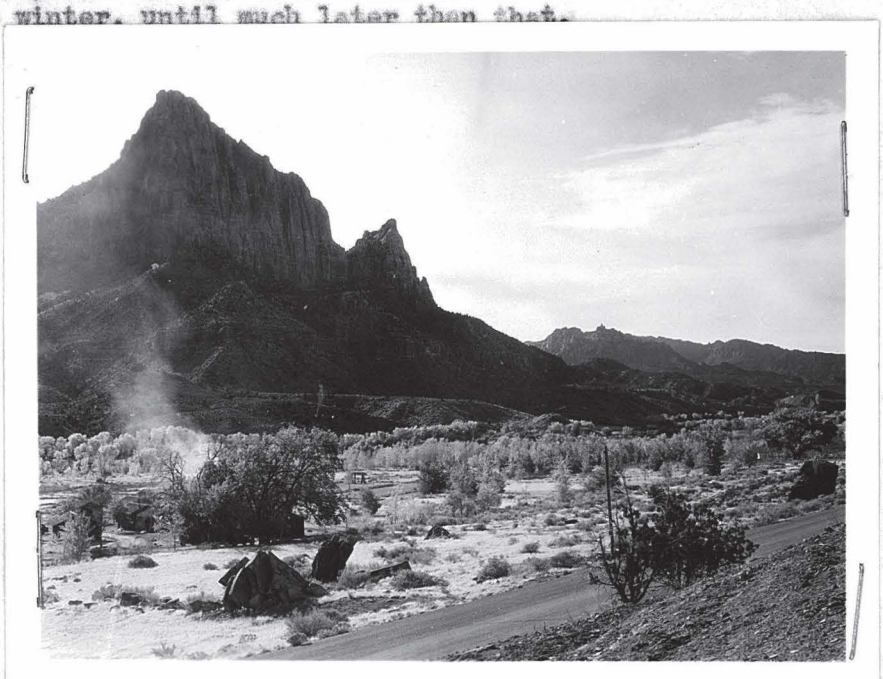

Fig. 20. View of the mouth of Zion Canyon, showing some of the public utility operator's buildings from which smoke can be seen rising; the CCC camp buildings are to the left, outside the boundaries of the picture. Most of the Zion Canyon deer seem to prefer semi-starvation to an exodus through this territory.

SUGGESTED MANAGEMENT POLICY

Artificial Feeding

At Zion National Park one is struck by the fact that the deer, although forced to subsist upon a depleted range, have not been pauperized by artificial feeding. By abstaining from this latter practice, the park administration has avoided the biological complications, as well as the unsightly domesticated animal spectacles, the establishment of which in other parks is now causing much regret. Certainly the staff at Zion is to be congratulated upon its farsighted policy of letting deer remain as deer instead of changing them into semi-domesticated pests, and although the animals are not in normal flesh, at least it can be said that they exhibit the alert wariness and attractive grace which distinguishes wild animals from domestic varieties.

Needless to say, any attempt at artificial feeding to solve the present problem would be prohibitively costly and would also fail to strike at the root of the trouble which is that there are too many deer in the area.

Proper Numbers to Maintain

Although the Superintendent and his staff are obviously in a better position than anyone else to judge as to the numbers of deer which should be removed in a given season, certain general recommendations can be made based upon experience with this problem in other areas.

We have already seen that during the winter months the deer in Zion Canyon are about three times as numerous as they ought to even if the range were in a normal condition. But the crux of the matter is that the range is <u>not</u> in a normal condition.

Presnall and Jolley's estimate of range destruction at between 40% and 80% is heartily concurred in, with the suggestion that the actual figure is nearer 80% than 40%. Moreover, most of the species damaged will probably require a number of years to recover even under the best conditions because the prevailing arid climate is associated with slow vegetative growth.

In view of these considerations, it is believed that in order to allow the vegetation to recover, somewhat less than the normal maximum number of animals must be maintained. Too often on overbrowsed ranges the temptation has been to set the maximum population limit not at what the now depleted range can handle but at the limit which the range might have handled when it was still in a virgin condition. Since the normal deer population in Zion Canyon under <u>optimum</u> conditions would be about 1 deer per 50 acres, or something less than 97 deer during a 12 month period, it will be seen that with a range which is 40% to 80% depleted, the number should be correspondingly reduced to an average of about 45 deer during the 12 month period, with an ultimate return to a quota of 97, more or less, after the range has recovered.

A complicating factor is that since about 100 nonresident deer are accustomed to join the resident population during the winter months, the average figure of 45 deer just mentioned would be difficult to maintain in actual practice, for, obviously even if there were no resident deer to all, assuming that the 100 nonresidents stayed in the canyon for 5 months the <u>average</u> population for the 12 month period would be almost 45.

Only actual experiments can show what proportion of the present winter deer population would remain during the following summer if a reduction campaign were carried on. Since about one-third of the present population is composed of outsiders, however, we may assume that if 200 deer, selected at random, were removed from the canyon, of the 100 survivors, 33 (more or less) would probably be outsiders which would migrate back to their ancestral haunts on the plateau in the spring, while 66 (more or less) would probably be residents which would remain permanently in the area. It will be seen, then, that even if 200 deer were removed, the average population over a 12 month period would be in the neighborhood of 80 individuals, which is nearly twice the figure considered desirable under present unsatisfactory range conditions. To play safe, in view of our knowledge, it seems best for the present to spare about 100 individuals, even though such a population may still leave too many in the area. If this reduction (66 2/3 %) appears drastic at first sight it may be remembered that it represents the price which we must now pay for having let range conditions get so far out of hand. Certainly, no one will contend that such a reduction would endanger the existence of the deer population in the canyon, while on the other hand it is to be expected that the herd will again build up and require additional periodic reductions in the future--preferably on a small-scale yearly basis rather than by occasional wholesale drives. The problem of keeping the deer reduced to the capacity of their range is as elementary, and operates upon the same principles, as the problem of the cattle man, who must (or should) limit his herd to the capacity of his pasturage by constantly eliminating the surplus. In the case of the deer, their natural enemies would ordinarily attend to this, but in the artificial environment of Zion Canyon man's presence prevents this, so that it is now man's responsibility to accomplish what nature can no longer do.

POSSIBLE REDUCTION METHODS

Various methods have been suggested for reducing the herd to proper proportions. These are listed here, together with certain comments, but no recommendations are made as to choice of methods because it is felt that Mr. Patraw and his staff are in the best position to make this decision.

A. Slaughter in the Park.

Mr. Patraw suggests that not to exceed fifty deer be slaughtered in cooperation with the State Fish and Game Commission, the meat to be disposed of through relief organizations. In view of the conclusions reached above, this number would be entirely inadequate to solve the deer problem unless Mr. Patraw's other suggestion--that the Fish and Game Commission open the deer season locally--can also be carried out, and unless the deer actually move into the unprotected areas adjacent to the park so that they can be shot during such an open season.

Since both of these latter contingencies are somewhat doubtful, it is believed that if the slaughtering method is adopted, approximately 100 deer should be killed at once, and then, if the Fish and Game Commission fails to open the season, or if the winter proves to be so mild that the deer refuse to leave the canyon, another 100 should be slaughtered as soon as it becomes evident that the proposed open season outside the park will not be effective.

Mr. Presnall has recommended a "reduction of the Zion Canyon herd by at least 50%". The killing (or removal by other means) of 200 deer here advocated represents a reduction of 66 2/3 %, which, in view of the depleted condition of the range, appears to be far from excessive. Whether or not legal authority exists at present for the slaughter of the deer on the grounds of an emergency is not entirely clear. If none exists then certainly further effort should be made as soon as possible to secure such authority, for the seriousness of the situation in Zion is surely so obvious as to constitute an overwhelming argument for such a delegation of authority. Society no longer permits an owner to deliberately let his domestic animals die of slow starvation and neglect; under circumstances wherein artificial management is equally necessary should the Federal Government be less humane?

B. Extension of the Hunting Season Adjacent to the Park.

The suggestion has been made that the State Fish and Game Commission lengthen the hunting season and open it on does as well as bucks, in the vicinity of Springdale, Rockville and Grafton, which are adjacent to the mouth of Zion Canyon, thereby eliminating the surplus deer which cross the park boundary while building up the good will of sportsmen, and at the same time benefiting various needy families.

Provided that enough deer leave the park so that hunting accomplishes the reduction, such a solution would seem ideal. The Service has continually insisted that an important benefit resulting from the creation of national parks is that they constitute a reservoir from which surplus game overflows into surrounding communities. Here at Zion, by adjusting the open season to coincide with the winter exodus, this policy could be put into actual operation.

Of course during certain mild winters the deer might not leave the canyon in sufficient numbers to bring about a proper reduction, so that slaughtering or some other method would probably have to be carried on inside the park more or less regularly.

The chief obstacle to the proposed lengthening of the hunting season and inclusion of does as game comes from the State Fish and Game Commission, which seems reluctant to take such novel action.

C. Trapping Within the Park.

Traping the deer in Zion, either for subsequent slaughter or for removal for restocking elsewhere, has not been considered very seriously by the administration because of the supposed costs. The Wildlife Division feels, however, that these costs may have been over-estimated. Previous experience with this problem at Yosemite has shown that deer can be baited into a corral very easily. If the corral is constructed properly, there is almost no loss from injury, and if it is provided with a small loading chute, the animals can readily be loaded into a pickup truck having closed-in sides and top.

From the standpoint of operating costs, it is believed that the time required to bait the corral daily, trap the deer and load (or slaughter) them, would scarcely be greater than the time which be required to patrol the canyon

and shoot the deer one by one. At Yosemite the wildlife ranger traped and hauled away 150 deer practically single handed.

Construction costs, also, need not be high. For the Zion Canyon reduction program two strategically placed V-shaped corrals about 100 ft. across at the widest, and tapering to about 3 ft., would probably effect a maximum saving in operating time, but one could be made to do if necessary. Using native poles and CCC labor the problem of construction would appear to be relatively simple. Plans for corals of this type could be furnished by the Wildlife Division if desired. If the State Fish and Game Commission could be persuaded to take delivery of the live deer, for stocking or other purposes, at the time of capture, the problem would be further simplified. However, it is <u>not</u> recommended that surplus animals be liberated on the plateau areas of Zion National Park itself, for the reason that the resident population there is already at a normal level.

SUMMARY

1. Zion Canyon because of its precipitous walls, constitutes a barrier to the dispersal of deer.

2. Because of an absence of predators and other natural checks the deer have multiplied until at present the population numbers 300 or more individuals, which is approximately three times what the range could support even if it were normal.

3. Even during the most favorable season of the year the deer are in poor physical condition as a result of malnutrition, while during the winter months there is a heavy mortality from starvation.

4. As a result of these conditions the ecologic zone inhabited by the deer has been reduced to a near-desert. The available forage has been reduced 40% to 80%--probably well above 50%--and reproduction of young plants of the species attacked is impossible.

5. Erosion control and stream revetment work is hampered by the lack of reproduction of soil-binding trees and shrubs.

6. In view of the present depleted condition of the range, the number of deer should be reduced to an average of less than 100 deer for the year. This will involve at least a 66 2/3 % reduction of the present herd.

7. If it is desired to dispose of the deer by slaughter, approximately 100 individuals should be slaughtered at once, after which, if the Fish and Game Commission fails to open the season or if the deer refuse to leave the canyon, another 100 should be slaughtered.

8. The suggestion that the present 10 day hunting season be extended in the vicinity of Zion Canyon by the Fish and Game Commission, together with an open season on does, would seem an ideal solution for the problem provided that the winter season is severe enough to drive the deer from the park.

9. Trapping of the deer within the park has been considered prohibitively costly, but it is recommended that further investigation of the costs be made if the Fish and Game Commission fails to extend the hunting season.

cc: Patraw (2)
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