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The Conservation of the Elk of Jackson Hole, Wyoming

A Report to

HON. DWIGHT F. DAVIS, *The Secretary of War,*
Chairman of the President's Committee on
Outdoor Recreation

AND

HON. FRANK C. EMERSON, *Governor of Wyoming.*

In this country the science of game administration should be more clearly understood by the public. It is not the mere exercise of police power for the protection of numbers of game. Unhappily American game today is still largely in the era of mere protection and dependent for existence upon inelastic statutes which do not conform to changing conditions and customs. Indeed, not infrequently, these statutes violate fundamental principles of biology.

Game administration includes rational protection of wild life adjusted to changing conditions, and excludes unnecessary and unmerciful waste. Over-protection, paradoxical as it may seem, defeats its end, and under its stimulus certain types of game animals multiply beyond their means of subsistence and cruel starvation ensues.

The case of the elk of Jackson Hole, Wyoming, is a striking example.

NATIONAL CONFERENCE ON OUTDOOR RECREATION

WASHINGTON, D. C.

T. SHAW JULY, 1927.

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COMMISSION ON THE CONSERVATION OF THE
JACKSON HOLE ELK

CHARLES SHELDON, Boone and Crockett Club, *Chairman*
W. C. DELONEY, of Jackson, Wyoming, representing the Governor of
Wyoming
ROBERT E. MILLER, of Jackson, Wyoming
IRVING H. LAROM, of Valley, Wyoming
E. A. GOLDMAN, U. S. Biological Survey
WILL C. BARNES, U. S. Forest Service
HORACE M. ALBRIGHT, National Park Service
F. S. HERBERT, General Land Office
SETH E. GORDON, Izaak Walton League of America
O. H. VAN NORDEN, Camp Fire Club of America
KERMIT ROOSEVELT, American Game Protective Association
T. S. PALMER, American Society of Mammalogists
ARTHUR RINGLAND, National Conference on Outdoor Recreation

July 15, 1927.

Hon. Dwight F. Davis, The Secretary of War,
Chairman, The President's Committee on Outdoor Recreation,
Hon. Frank C. Emerson, The Governor of Wyoming.

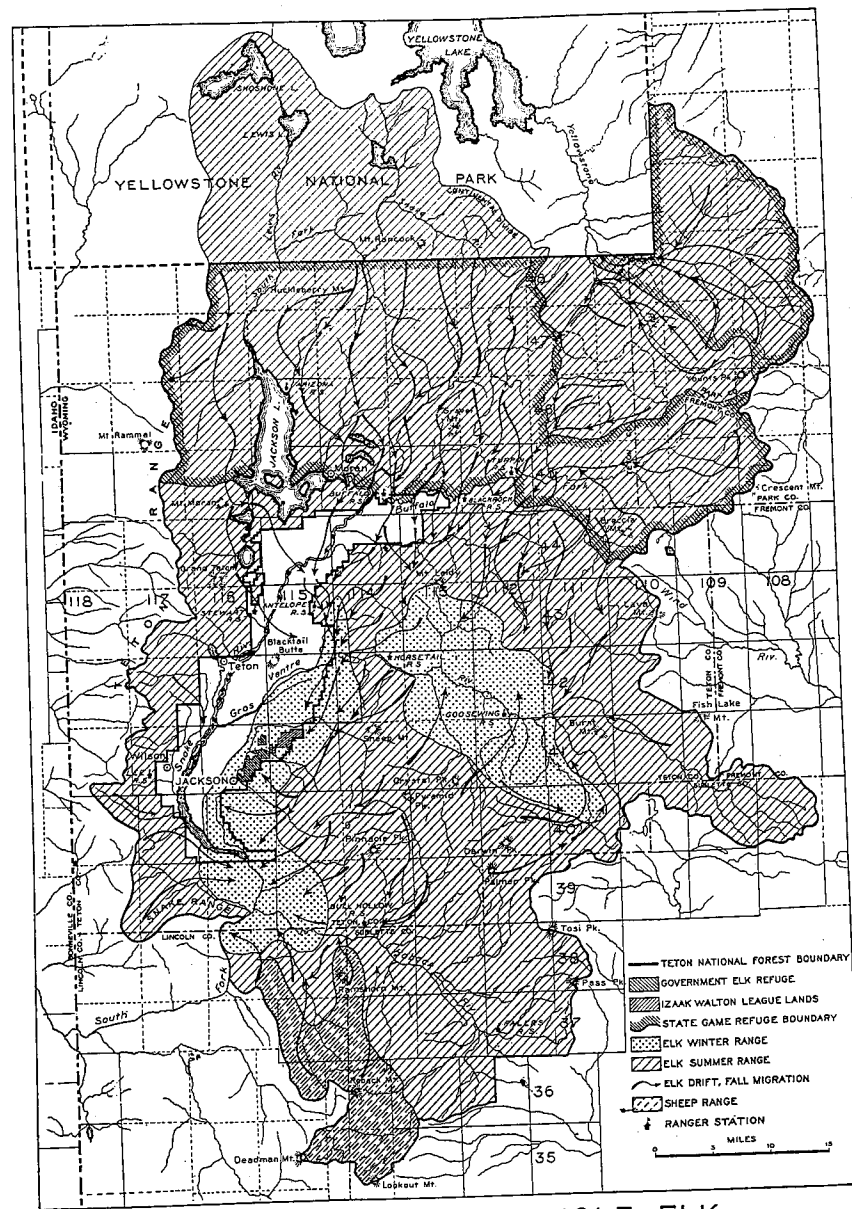
GENTLEMEN :

I have the honor to transmit for your consideration the report of the meeting of the commission appointed to consider the conservation of the elk herds in the vicinity of Jackson Hole, Wyoming, held in Washington, D. C., February 28 to March 4, 1927.

Very respectfully,
CHARLES SHELDON, *Chairman.*

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RANGE OF JACKSON HOLE ELK

FOREWORD

The conservation of the elk in Jackson Hole¹ has become a problem directly as a result of the development of that section of the State of Wyoming. Formerly herds of elk from the southern part of the Yellowstone National Park and from the high regions along the Continental Divide immediately south of the Park passed Jackson on their autumn migration and wintered in the Green River Basin. The settlement of the country and the introduction of domestic stock deprived the elk of this wintering ground. As a result the migrating herds now winter in Jackson Hole and vicinity, a region of scant summer rainfall and heavy winter snows in which the elk are unable to get sufficient forage. The ranches of settlers naturally attract the elk and the haystacks suffer. The congestion of the elk herds and the lack of feed has resulted in starvation and losses on a large scale during severe winters—one of the most tragic situations in the annals of wild life conservation.

Although thousands of elk in the herd have died in past years the Jackson Hole elk herd today is one of the largest groups of big game animals within the United States. It is an unique, economic and recreational asset of national importance, and is also of great potential value to Jackson Hole valley and the State of Wyoming as a permanent source of income.

The welfare of this herd has for years been the subject of serious conferences, investigations and reports. Yet the conditions which cause recurrent starvation still exist. For the purpose of working out a plan and deciding on a definite course of action for the permanent conservation of the elk of Jackson Hole the National Conference on Outdoor Recreation requested the President's Committee on Outdoor Recreation to appoint a commission representing all agencies directly engaged in handling the elk as well as all organizations hitherto actively interested in their welfare. The Hon. Dwight F. Davis, Secretary of War and Chairman of the President's Committee, designated such a commission, including a representative appointed by Hon. Frank C. Emerson, Governor of Wyoming.

The commission met in Washington, D. C., February 28 and continued in session until March 4. At the same time local

¹That part of Teton County extending from the southern boundary of the Yellowstone National Park south to the canyon of Snake River and from the Teton Mountains on the west to the foothills on the east is commonly known as Jackson Hole. The valley is said to have been named in 1831 in honor of Captain David Jackson, one of the partners of the firm operating the American Fur Company.

representatives of State, Federal, and public agencies in Jackson Hole undertook to obtain a complete count of the herd.

This report* of the commission, based for the most part on the voluminous record of its proceedings, is submitted for the consideration of the appropriate State and Federal authorities in the hope that with public approval of the policies recommended the Federal Government and the State of Wyoming will act jointly to conserve for all time, in a remarkably beautiful section of the Rocky Mountains, one of the great types of American big game, the finest of its genus in the world.

*Acknowledgment is made to A. C. McCain and C. E. Rachford of the U. S. Forest Service, for assistance in the preparation of the report; to Paul Redington, Dr. E. W. Nelson of the U. S. Biological Survey, L. C. Everard of the U. S. Forest Service, and Smith Riley, for review.

RESOLUTIONS

The Commission agrees that the solution of the problem of the elk of Jackson Hole demands a complete plan of game administration, revised annually to meet the exigencies of the situation as they arise, to be jointly agreed upon and executed in common by the Wyoming State Game and Fish Commission and the United States Department of Agriculture (Forest Service and Biological Survey) and therefore resolves that this plan should include the following measures:

1. The definite allocation of duties, authority, and responsibility of the respective agencies;
2. The pooling of effort and resources by these agencies;
3. The creation of an Advisory Board to assist these agencies in the correlation of administrative plans with local and State economic welfare, and to promote public interest. Said Board to consist of one member designated by each of the following agencies: The Wyoming Game and Fish Commission, the Forest Service and the Biological Survey of the United States Department of Agriculture, the local stock interests of Jackson Hole, the Dude Ranchers' Association, and interested sportsmen's organizations. In addition to executive sessions it is suggested that the Board hold an annual public session and hearings not later than July 1 in Jackson, Wyoming, for the purpose of reviewing the facts pertaining to the condition of the elk herd during the past season and making recommendations to the appropriate State and Federal authorities for the administration of the herd for the ensuing season;
4. The determination of the number of elk of graduated age class and sex that can and should be permanently maintained, considering the available or possible food supply and the need for avoiding undue sacrifice by local industries. It is recommended that this number be provisionally fixed at 20,000 head;
5. A cooperative count annually if possible of the elk herd to determine the annual fluctuations—increase or decrease—from 20,000 head, and to afford a basis for revision of the plan of administration;
6. A simultaneous winter count of the Northern Yellowstone, Shoshone, Wind River, and Green River herds. These herds intermingle more or less on the summer range with the Jackson Hole herd although they occupy widely separated areas during the winter months. A count will afford essential data for their administration;
7. The establishment of an experiment station, and as soon

as practicable the undertaking by the U. S. Biological Survey in cooperation with other Federal, State, and unofficial interested agencies of a comprehensive investigation of the life history of the Jackson Hole elk and the factors affecting their maintenance in suitable numbers, and of similar investigations of the Northern Yellowstone, Shoshone, Wind River, Sun River and Green River herds and their relation to the Jackson Hole herd;

8. The introduction in the 70th Congress of legislation appropriating funds to purchase lands and provide for their equipment, maintenance, and operation; to buy hay and to lease pasturage, so that, with the additional measures supplementing the resources afforded by the lands already controlled, adequate winter feed and protection may be provided for 20,000 head of elk;

9. The withdrawal from entry of the unreserved unappropriated public land in isolated tracts surrounded by or contiguous to the land to be purchased or to the present U. S. Biological Survey Elk Winter Refuge or the Izaak Walton League Refuge (now authorized to be deeded to the Federal Government as a part of the Federal Refuge);

10. In order that the elk of the Jackson Hole Unit may be maintained at the number agreed upon, and that the surplus animals may be properly disposed of, or the herd properly safeguarded in the event of a decrease, provision in the Wyoming law is recommended to permit the exercise of wide discretionary power on the part of the State Game and Fish Commission, so that as unforeseen climatic conditions or other emergencies arise the Commission may take prompt and decisive action to preclude any wide variation in the numbers of the herd. Rigid statutes unchangeable except at stated biennial periods will preclude this control. Specifically, it is suggested that the State statute of 1890 points the way to the effective exercise of this necessary administrative power by the Game and Fish Commission. Under this statute the killing of any elk was prohibited throughout the year. This same provision might be restored with the addition of a qualifying clause to read in effect "except under rules and regulations of the Fish and Game Commission." Such legislative authority will permit the State Game and Fish Commission to determine the limitations of the hunting seasons, the number and kind of animals to be taken, the areas to be designated for hunting, and the disposition and economic use of surplus stock; and to provide for cooperation with Federal and other agencies. The State authorities can then carry out intelligently the policy of regulated hunting so forcibly stated by President Roosevelt in *The Outlook* of March 31, 1912, page 713; a policy which this Commission endorses as a cardinal point in game administration:

There are all kinds of problems connected with preserving wild creatures, by the way, and one of the most important of them, of a totally unexpected kind, has come to the front during the last decade in connection with the Wapiti, the elk of the Yellowstone Park. The Yellowstone Park was always a favorite summer range of the elk. Under protection they have increased enormously in numbers. They summer within the Park; although some of them winter within it, especially near its northern border, the majority tend to get out, especially to the south. All wild birds and animals, of course, possess a fecundity such that when natural checks are removed they increase in geometrical ratio. This is true of them just as it is true of tame animals; let any kind-hearted lover of animals remove all checks on the increase of, say, the cats or rabbits on his place, and inside of a year he will find this truth illustrated by practical experiment. Almost any species, if free from natural enemies, increase so fast as speedily to encroach on the possible limits of its food supply, and then either disease or starvation must come in to affect the fecundity. In European game preserves the shooting tends to keep down any abnormal increase—although even in these game refuges over-preservation often results in stunting the development of the animal or exposing it to diseases. In America hitherto the success of the effort to preserve the different kinds of wild creatures has not been great enough to cause us any alarm as to their over-increase, with the single exception of the elk in the Yellowstone Park. But this is a very serious exception. Elk are hardy animals and prolific. It is probable that a herd under favorable conditions in its own habitat will double in numbers about every four years. There are now in the Yellowstone Park probably thirty thousand elk. A very few moments thought ought to show anyone that under these circumstances, if nothing interfered to check the increase elk would be as plentiful as cattle throughout the whole United States inside of half a century. But their possible range is of course strictly limited, and as there are no foes to kill them down, the necessary death rate is kept up by nature in a far more cruel way—that is, by starvation in winter. The suffering and misery that this means is quite heartrending. Every winter the Wapiti herds that go south of the Yellowstone Park lose thousands upon thousands of their numbers by the long drawn agony of slow starvation. The loss falls especially, of course, on the calves of the year, and the cows in calf—the very animals that under any proper system of hunting suffer least. From time to time well meaning people propose that the difficulty shall be met by feeding the elk hay in winter or by increasing the size of the winter grounds. Of course there are circumstances under which feeding hay is not only proper but necessary, and it may be that there can properly be made a slight enlargement of the winter range of the elk. But as a permanent way of meeting the difficulty neither enlarging the range nor feeding with hay would be of the slightest use. All that either could accomplish would be to remove the difficulty for two or three years until the elk had time to multiply once more to the danger point. What is needed is recognition of the simple fact that the elk will always multiply beyond their means of subsistence, and that if their numbers are not reduced in some other way they will be reduced by starvation and disease.

It would be infinitely better for the elk, infinitely less cruel if some method could be devised by which hunting them should be permitted right up to the point of killing each year on the average what would amount to the whole annual increase. The herd must be kept stationary, and it should be kept stationary in some way that will work the least possible cruelty to the animals and will be of most use to the people of the country, especially of the States in which the park is situated. Of course, the regulation should be so strict and intelligent as to enable all killing to be stopped the moment it was found to be in any way excessive or detrimental. There should be no profit hunting, that is, no sale of the meat or trophies.*

The problems involved in the management of the Jackson Hole Elk Herd are in a measure common to those affecting the conservation of other important herds such as the Northern Yellowstone, Shoshone, Wind River, Sun River, and Green River herds, and the unique Roosevelt Elk of the Olympics in Washington. The States of Wyoming, Montana, Idaho, Colorado, Arizona, and Washington and their sportsmen's associations are vitally interested. It is recommended that the President's Committee on Outdoor Recreation empower the Commission on the Conservation of the Jackson Hole Elk to serve as a continuing body, and that the Commission undertake, with the addition of representative personnel, a complete series of studies looking to the conservation of the American Elk throughout its western range.

These conclusions are based upon the facts given in the following report.

*This last sentence refers, of course, to those elk killed by sportsmen.

FACTS*

For a period of nearly sixty years the elk of Jackson Hole have been under some form of protection, including the establishment of a great state sanctuary in 1905¹ and the carrying on of periodic winter feeding from 1910 to the present. Nevertheless the Jackson Hole elk herd is today subject to the tragedy of recurrent starvation and the influence of other undetermined factors.

The salient factors which continue to jeopardize the integrity of the herd and forbid the realization of their proper community and national value are:

1. Unstable winter food supply;
2. Lack of control of the annual increase;
3. Inelastic laws and consequent lack of exercise of administrative power in the field;
4. Insufficient coordination of responsible agencies.

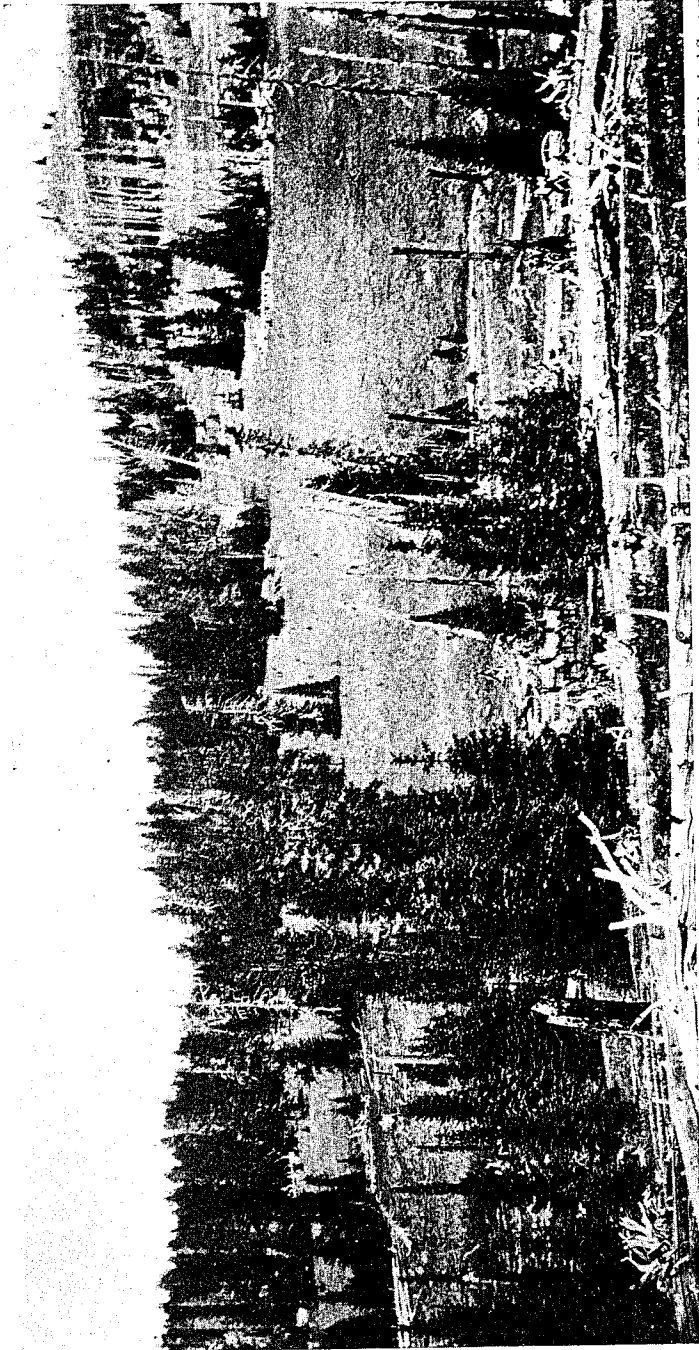
SIZE OF HERD BASED ON WINTER FOOD SUPPLY

The forage capacity of the summer ranges of the elk is relatively unlimited and the factors affecting the life of the herd during their occupancy are favorable and constant. Conversely the food capacity of the winter ranges is limited, because of the pressure of human occupancy at the low levels. The factors of environment are therefore unfavorable and variable and become particularly acute in severe weather. The difference in carrying capacity between the winter range and the summer range explains the recurrent starvation. It is the crux of the problem.

It is a well known biological fact that all animals tend, if unchecked, to increase beyond the limits of their food supply. The elk is no exception. No doubt before the settlement of the country, and even discounting the influence of Indian hunting, there was an annual attrition which kept the herds within limits. They had to contend with natural causes and the competition of other species. But these natural checks have been largely removed and artificial obstacles substituted. The summer ranges, where natural conditions continue ideal for propagation and where over a great area complete sanctuary¹ is enjoyed, annually

*This report is confined to a consideration of the herd of elk which winters in the Jackson Hole and on the Teton National Forest generally referred to as the Jackson Elk Herd. The Yellowstone Park, Shoshone and Wind River herds are excluded although it is recognized that drift from the Jackson Hole Herd may influence these groups. Moreover, no attempt has been made to include a detailed discussion of the natural history of the elk. The interested reader is referred to reports of the Biological Survey and of the Forest Service of the U. S. Department of Agriculture, notably those of Preble, Bailey, Nelson and Graves. It is the purpose of this report to give essential background facts and the conclusions that may be drawn from historical experience, and to suggest a course of action to govern the future administration of the Jackson Hole herd.

¹Teton State Game Preserve.



Photograph by U. S. Biological Survey
The high mountain summer ranges afford ideal natural conditions for the welfare of the elk. The factors effecting the life of the herd during their occupancy are favorable and constant. The forage capacity is relatively unlimited. With the advance of snow in the fall the animals drift down to the lower ranges

turn off increased numbers. This uncontrolled increase must fight a losing battle in the winter on a range so modified by man that the integrity of the herd is continually in jeopardy.

Hay produced or that can be produced on ranches in the Jackson Hole, Gros Ventre or other agricultural areas within the locality where elk may be compelled to "yard up" for the winter affords the only dependable supply of food. Upon the stability of this supply the conservation of the Jackson Hole herd primarily pivots.

Since, then, artificial feeding must be resorted to in winter, and since the summer ranges are capable of turning off a relatively unlimited number of elk, it follows that the amount of winter feed that can be produced without serious displacement of other community interests is the factor that determines how large a herd may be continuously maintained.

The number of elk, of proper age classes and sex, that is commensurate with available or possible food supply and that can and should be maintained without undue sacrifice to local industries is designated as the optimum number. The fixing of this number is basic in any plan for the future welfare of the Jackson Hole herd. Once this number is determined it is possible to stabilize winter feeding conditions and minimize the adverse influence of the variable factors of the open range in sufficient degree to protect the integrity of the herd. It should be understood, however, that this number is not absolute and fixed for all time. It is a guide from which intelligent departures and adjustments can be made as circumstances from time to time may dictate.

From the record of counts it will be noted that the Jackson Hole herd has reached over 19,000 head three times in the last 25 years, which may be accepted to indicate that under normal conditions the herd may be maintained at approximately 20,000 head. This number then is adopted as the initial optimum. Experience may prove that it is too high. It is the initial guide number, however, on which is based a suggested plan of administration and feeding operations.

MEETING THE FEED REQUIREMENTS OF A HERD OF 20,000 JACKSON HOLE VALLEY

The annual counts show that a maximum of 59% of the herd has been fed in the Valley in any one winter. Twelve thousand head, in round numbers, is then the maximum that it is necessary to provide for on the basis of a herd of 20,000. One ton of hay for every three animals or a total of 4,000 tons would be sufficient for the feeding of this number for 90 days. However, past records indicate that provision for the feeding of a maximum number is not necessary every year. It is estimated that only one winter out of four will necessitate this

provision and that during the three intervening years only the average number of elk will come to the feed grounds.

The hay production tonnage of the Biological Survey Elk Refuge and of the Izaak Walton League Refuge is not now sufficient to provide for the elk annually frequenting the Valley. The additional tonnage may be assured in part by the purchase of privately owned ranches. There is, however, in the opinion of the Commission, objection to the Federal acquisition of productive lands and their removal from the taxable resources of Teton County wherever this can be avoided. Hay can be bought from the local ranchers in emergency and a welcome market afforded for the upkeep of a struggling community.

Certain lands must be bought, in any event, if adequate control of the elk drifting into Jackson Hole is to be maintained. There must be acquired by purchase the lands which now separate the Izaak Walton League lands and the Government Elk Refuge, and which extend north along the migration route of the elk to the Gros Ventre River, near the town of Kelly, as well as several ranches closely adjoining these refuges, in order to round out the area of control and make it a refuge that the elk can occupy without being disturbed and without trespassing on private property.

The elk in their semi-annual migration are more or less thrown together at the north end of this proposed purchase area. This is caused by the topography of the country, which makes this section one of the principal crossings of the Gros Ventre on feasible routes to the winter refuge. As soon as the elk have crossed the Gros Ventre River they spread out over the proposed purchase area and the adjacent foothills where, if undisturbed, they occupy extensive and productive range pasture on which is found ample feed for fall, early winter, and spring. With these lands in private ownership the elk are harassed and driven back into the hills where snow and feed conditions are unfavorable, or else they are driven onto the elk refuge hay lands and pastures, which should be withheld as much as possible for later use. In occupying or crossing these private lands the elk not only damage crops, but they damage fences, ditches, and other improvements, and compel the owners of the lands to adopt measures detrimental to the welfare of the animals.

The lands recommended for purchase, together with the adjoining National Forest lands that are now set aside for the exclusive use of the elk, will consolidate the present Biological Survey lands and the Izaak Walton League lands, and afford a route from the elk winter range area to summer range on the National Forest without crossing privately owned lands. These lands, aggregating over 9,000 acres, can now be purchased for a reasonable price. The upkeep will be relatively small, because there will be no need of maintaining fences or other ranch im-

provements. Some of the lands, included through necessity, will produce hay and thus reduce the annual purchase requirements.

With the present elk refuge at Jackson enlarged, by purchase of all the lands recommended, this particular refuge and winter feeding unit can be considered complete and approximately 60% of the whole herd safeguarded under the most adverse conditions.

GROS VENTRE AND OUTLYING AREAS

When the maximum number from the whole herd frequents the Jackson Hole feeding grounds only 24% are found in the Gros Ventre region and 17% in widely scattered groups in outlying localities. In average years 33% of the whole herd are found along the Gros Ventre and 25% in the scattered areas. However, in the years of average distribution the weather conditions are favorable, and so it may be assumed that normally about 6,200 head can carry through on the Gros Ventre and 5,000 in scattered groups. In severe winters the normal tax on the Jackson area is increased by the drift of 3,000 head for which provision is made in the feeding plans, and the herd is reduced proportionately elsewhere; on the Gros Ventre to 4,800 head; in the outlying areas to 3,400 head. In the event conditions presaged a severe loss on the Gros Ventre it might be possible to entice some of these elk to the valley near Kelly or to the refuge at Jackson where it would be practicable to feed them hay.

It would be obviously impossible to make this provision for the small outlying bands with the possible exception of a group of 800 head which ordinarily winter south of Jackson on both sides of Snake River on range centering about Munger Mountain. During the last hard winter the State of Wyoming acquired some hay in the immediate vicinity of Munger Mountain and was able thereby to avert a loss which during previous hard winters had occurred in this vicinity. It is understood that the State Game Commission now has under consideration the establishment of a State hay feeding station unit near Munger Mountain to take care of this situation. If these plans do not mature it would be advisable to incorporate this group of 800 elk in the general Federal feeding plan here recommended. This would avoid divided responsibility.

The establishment of feeding grounds on the Gros Ventre River is not recommended at this time, because feeding hay induces an increased number of elk to come to or remain in such localities, and the possibility of producing a commensurate amount of hay in the Gros Ventre River Valley is decidedly remote. It has been demonstrated by trial that tame hay species can not be propagated and raised in that section and that the few areas at all adapted to wild species are low in productivity. However, there are a number of ranches in the Gros Ventre Valley which in Government ownership or under Government control



Photograph by S. N. Leek

The food capacity of the winter ranges, due to the settlement of the country, is limited. The factors of environment are unfavorable and variable. The tax on forage becomes greater with each year of uncontrolled increase in the herd

through lease would be important and valuable elk winter range areas. These lands are on the whole the most productive of elk forage of any within the Gros Ventre elk winter range area. As this land is now in private ownership the elk not only are prevented from utilizing the forage but it is necessary for the owners of the land to harass the elk more or less in order to protect their fences, pasture and hay.

Further study and investigation will undoubtedly reveal opportunities for protecting the elk in the Gros Ventre and outlying areas. They constitute an important percentage of the whole herd. It is not unreasonable to suppose that an unusually severe winter might greatly reduce their numbers, thereby upsetting the best of well laid plans for the unit as a whole. It would be desirable to purchase or lease some of the Gros Ventre ranches and devote them to elk pasture without any attempt at harvesting of crops. Moreover, under administrative control investigations may develop practical means of increasing both the quality and quantity of native forage.

CONTROL OF THE ANNUAL INCREASE

All of the measures hitherto taken for the preservation of the Jackson Hole elk herd have been protective. During the last sixty years the State has taken numerous steps looking to this end, such as the fixing of seasons of hunting, the bag limit, the establishment of refuge, and the feeding of hay on the winter range in cooperation with the Federal Government. But these steps leave much to be desired. The integrity of the herd is always threatened if sole reliance is placed upon mere protective measures, however stringent. Protective measures are of course essential and must be inaugurated as soon as man interferes with the natural environment and habits of game. But over-protection, paradoxical as it may seem, defeats its end, for under its stimulus the animals are so safeguarded that they multiply beyond their means of subsistence. More food does not solve the difficulty for its provision simply means more elk—a perfect example of the classic vicious circle, as was so well pointed out by President Roosevelt.

Provision for adequate winter feeding and enlargement of the winter refuges to provide for an optimum herd of 20,000 head has been outlined. But it must be emphasized that this is the number designed to be kept at a continuous level and therefore always commensurate with the forage and range provided. Obviously this cannot be accomplished unless there is provision for the disposition and economic utilization of the annual increase. Because of the lack of cheap transportation, transplanting of the surplus stock on an adequate scale is not practicable. The number of elk legally killed by sportsmen, estimated to average 900 head annually, is relatively insignificant to the total annual increase under normal conditions. This number should

be increased by regulated hunting, as was advocated by President Roosevelt, and if the excess is not removed in that way there must be provision for official killing and the disposal of the carcasses for economic use.

An effective system of regulated hunting as a means of disposal of surplus stock is predicated upon the determination of the annual kill factor, or the number, class, and sex of animals that may be safely removed without affecting the breeding stock. When determined for the herd as a whole its proper application becomes of essential importance. The distribution of the herd and its make-up, the understocking or overstocking of the range, the rutting season, the period of calving, routes of migration, and other factors should determine the specific locality, time and class of kill. The present State system, however, does not permit this control, so essential to intelligent game administration. The present laws do not restrict the numbers of elk licenses issued. While the present kill is far too low to dispose of the increase, nevertheless there should be authority to restrict and limit or to increase the number of licenses whenever circumstances warrant. Moreover present licenses permit the kill of an elk of any class, anywhere outside of the refuges, and at any time within a prescribed period. The licenses should recite on their faces the class of kill permitted, the particular local shooting range, and the period of time for which they are good, which may well vary on different ranges.

The present state laws embrace an excellent requirement, of essential value in the determination of the kill factor. Each licensee is required to report to the State Game and Fish Commission the number and kind of animals killed and the time and locality of the kill. Unfortunately the returns to the State are so meager that the annual report of the total number killed is a mere estimate. If the State decides to locally control and regulate the hunting of elk in the Jackson Hole region, practical measures can no doubt be devised for the return by hunters of an accurate record of kill. Once the sportsmen can be impressed with the necessity and value of such a record their cooperation will follow.

RESEARCH

Knowledge of the life history of the Jackson Hole elk herd is largely empirical. There has been no attempt to carry out intensive and continued scientific research, although for years this resource of positive local and national value has been the object of concern. No intelligent long-time plan for the welfare of these animals can be put into operation until fundamental principles are worked out. In the absence of this precise knowledge the integrity of the herd must continue in jeopardy and local interests must be subjected to unnecessary adjustments.

Many questions of primary importance need to be thoroughly studied. The fixing of the optimum herd at 20,000 head is largely speculative. The maintenance of the breeding stock in proper numbers and in the proper proportion of sexes is a controlling factor. In regard to this latter factor little is known beyond what is indicated by general observation; i. e., that the proportion of sexes is about equal at birth and that among mature elk females predominate. The explanation that hunters kill more bulls than cows will not hold as to the Jackson Hole elk, because local residents who kill for meat almost always kill cows. Just what the proportion of sexes is at birth and, if approximately equal, what becomes of the bulls before reaching maturity is something about which there is little authentic information.

A count for determination of age classes and sexes cannot be made of the entire herd because of the difficulty of distinguishing one class from another under conditions that obtain in the hills. The method that has been followed is to count on the feed grounds where the elk are under control and apply the percentages thus obtained to the entire herd. At the present time the only practical method of taking a census of the elk is by counting during the winter months. Under certain weather and snow conditions which drive the maximum number of elk to the lower country, a fairly accurate count can be made. In winters of light snowfall the elk remain too much scattered in small bunches to permit a satisfactory count. Counts under such conditions of course, return only the total number of elk without segregation by age classes or by sex. Migration counts, moreover, are impossible under present conditions, for most of the elk leave the grounds in the spring during the night and have immediate access to rough timber covered hills. Counting during the fall migration is equally difficult because the animals struggle through rough country and generally at night.

Comparison of the periodic counts for the determination of loss or gain of the whole herd can not be made accurately with present knowledge. The Northern herd, the Shoshone herd, the Wind River herd, and the Green River herd intermingle with the Jackson Hole herd more or less on the summer range but occupy widely separated areas during the winter months. To what extent this condition may affect and account for varying numbers in the Jackson Hole herd has not been determined. The first step toward such determination is a simultaneous winter count of all the herds over a period of years.

Without more precise knowledge of the number, age classes and sex of the Jackson Hole herd it is difficult to determine the kill factor intelligently. Yet this factor is a pivotal point in game administration; for it controls the character of the surplus stock and its removal.



Photograph by U. S. Biological Survey

Inevitably there comes a point, marked by a severe winter, when the animals have multiplied beyond the supply of winter forage. Starvation ensues. This elk is in the final stages

Game refuges are established for the purpose of providing shelter, feed and seclusion during critical periods in the life of the animals. Once established, however, it is difficult for the public to appreciate that they need not necessarily be maintained in perpetuity. Their establishment presupposes that animals under absolute protection will be reared and drift to adjoining areas and that eventually the whole area will become fully stocked. When this time arrives, as it apparently has with the Jackson Hole elk herd, the rigid maintenance of extensive refuges on the fall ranges may interfere with the success of regulated hunting. The effectiveness of regulated hunting depends upon the proper location of hunting areas, control and regulation of numbers taken from such areas, as well as the extent to which it can be employed to better control distribution and preserve the element of sportsmanship. These factors in game administration are worthy of the most careful study and investigation.

The problems of forage utilization by elk are identical with the problems of forage utilization by livestock. A more accurate determination of the kind, amount, quality and distribution of forage species adaptable to elk is a prime requisite in game management, especially so where early use in the spring of the year may result in heavy overgrazing of areas which should be reserved for winter use. This then brings up the problem of how distribution of the elk can be more effectively controlled to meet forage growth requirements. Experimental plots, properly chartered, and records kept over a period of years are absolutely essential to determine the effect of grazing on the forage crop.

Forest producing land may become so heavily stocked with game animals as to injure timber reproduction seriously or retard its establishment and growth. This problem demands the attention of forest biologists.

Just how much of a factor predatory animals are has not been determined with any degree of accuracy. In Jackson Hole the coyote is considered a valuable fur-bearing animal and is extensively hunted as such by local residents and professional trappers. In view of the fact that the coyote is a source of no mean income to local residents, there ought to be an exhaustive study of the coyote's place in the administration of wild life in Jackson Hole.

Disease and parasites are other factors of which we have no certain knowledge. A form of scab is more or less prevalent among the Jackson Hole elk. Some years ago the Bureau of Animal Industry made an investigation and pronounced this form of scab not a serious menace. Ticks are abundant during the spring months and are a source of annoyance to all kinds

of animals. Whether or not they kill elk calves as has recently been suggested has not been determined.

There are other factors in the life history of the elk of which little is known. Recently it has been observed that good heads of antlers are not so commonly found as in former years. If in fact there is marked decrease in the size of antlers this is symptomatic of a serious condition that needs investigation.

These are some of the questions that need to be solved through research. As a first step in carrying out a research program the present Biological Survey Winter Elk Refuge should be developed into an experiment station.

ADMINISTRATIVE RESPONSIBILITY AND COOPERATION

Enough has been said to make it clear that the intelligent conservation of the Jackson Hole elk demands a working plan of administration continually fortified by the findings of scientific research. This plan must be cooperative, inclusive, and jointly supported by the governmental agencies interested—the Forest Service and the Biological Survey of the U. S. Department of Agriculture—and the State Game and Fish Commission of the State of Wyoming. Special investigations and scientific research are the function of the Biological Survey. The Forest Service by reason of its administration of the Teton National Forest, including the greater part of the elk range, is well equipped and prepared to record general data from field observation and to assist the State in the patrol of game areas and in the enforcement of the game laws. It is the function of the State on recommendation of its Game and Fish Commission, to enact the necessary legislation and confer the necessary broad administrative power to make the plan of administration effective. In addition it is desirable that representatives of all local interests participate in the development of plans for the administration of the game. This can be effectively brought about by the recognition of an advisory board composed of such representatives.

If results are to be obtained there must be concerted action by all interests involved. It would be futile for the Federal Government to acquire feed and range sufficient to support a fixed number of elk if the State laws remain so inelastic that proper disposition of the surplus stock cannot be made. Unless accurate data are obtained through research the plan of administration must proceed by the costly process of trial and error. It is a situation in which the residents of Jackson Hole, stockmen, tourists, the State and Federal Governments, dude ranchers, and the general public have a common interest. It requires local cooperation, aided by the best qualified and experienced Federal and State authorities, and backed by a sympathetic and constructive public opinion.

PRINCIPAL LEGISLATIVE ACTION

GENERAL MEASURES

Wyoming was established as a Territory July 10, 1868, and was admitted as a State July 25, 1890. It was formed from parts of the former territories of Dakota, Idaho, and Utah.¹ At the time of the creation of Wyoming Territory, Dakota and Utah had no laws protecting big game, and Idaho and Utah a simple statute establishing a closed season from February 1 to July 1 for elk and other big game.

During the 22 years prior to the admission of Wyoming to statehood several important events occurred that had an influence on the conservation of elk: (1) The first game law was passed by Congress in 1869, (2) the killing of elk was restricted and waste of game was prohibited in 1871, (3) the Yellowstone National Park was created in 1872, (4) non-residents were prohibited from killing game in 1886, (5) the appointment of game detectives was authorized in 1886, and (6) the open season on big game was abolished in 1890.

The first game law in 1869 prohibited offering elk or other big game for sale between February 1 and August 15. It was followed in 1871 by the enactment of the first closed season on elk and other big game from March 1 to August 15. Game could be killed at any time for immediate wants but, even in the open season, it was unlawful to kill more than could be disposed of to advantage. In 1882 the open season was changed to the last four months of the year, September, October, November and December, and the killing of more game than could be used for food for the use of a family was prohibited. Two years later provision for game detectives was made by requiring sheriffs, constables, and other peace officers to see that the game laws were enforced. In 1890 the open season was abolished and the killing of elk or other big game was prohibited throughout the year. Bona fide residents, however, were allowed to kill game for consumption by their own families.

In Territorial days there were few settlers in Jackson Hole to hunt the elk. Also there was very little hunting by non-residents, and such hunting was discouraged by a provision in the game laws of 1886 prohibiting non-residents from killing game. The restrictions on killing elk were simple and were directed chiefly toward preventing commercialization of the game, prohibiting waste, and providing officers for enforcing the game laws. As early as 1871 authority was given residents to kill a

¹That part of the territory west of the Continental Divide was formerly in Idaho and the southwest corner, south of the latitude of the boundary line between Idaho and Utah, was formerly part of Utah. That part of the State along the western boundary and south of the Yellowstone National Park was formerly Uinta County but was later subdivided into several counties of which Teton is now the one adjoining the park.

supply of game at any time for their immediate wants, and with the abolition of the open season in 1890 this provision was again enacted.

In the two decades following admission of Wyoming as a State protection of the elk advanced steadily and a number of new features were incorporated in the laws. The prohibition of hunting by non-residents was replaced in 1895 by a non-resident license; in 1899 a guide license was required, and in 1905 a license for photographing big game. The latter year also marked the establishment of the first game preserve immediately south of Yellowstone National Park. In 1907 hunting elk for teeth, or "tusk hunting," was made a felony. Two years later came the first State appropriation for feeding game, and in 1910 the first experiment of transferring elk from Jackson Hole to other parts of the State. Several experiments were made in providing the machinery necessary for administering the game laws. In 1895 the Fish Commission, established sixteen years previously, had its jurisdiction extended to include game. Four years later a State game warden was provided to give his entire attention to game protection. This system of a State game warden appointed by the Governor was continued until 1911, when it was replaced by a game commission, comprising the Governor, Secretary of State, and State Auditor, to administer the game laws. The State game warden was appointed by this Commission.

Hunting by Indians proved a serious problem for the settlers. In addition to the Indians from the reservations within the State, the Crows and the Crow Agency in Montana and the Bannocks from the Fort Hall Reservation in Idaho were accustomed to cross into Wyoming to hunt big game in the autumn. Under a treaty with the Bannocks the United States had guaranteed the Indians in perpetuity the privilege of hunting on vacant public lands. Many of these Indians were accustomed to hunt elk in Jackson Hole. It was largely to check the activities of hunting parties of Indians that the State in 1895 passed a \$20 non-resident license law (Laws 1895, Chap. 98), the highest non-resident hunting license at that time in any of the States of the West. In July, 1895, Race Horse, a Bannock Indian from the Fort Hall Reservation, hunting without a license, killed seven elk in Jackson Hole and was arrested by John Ward, Sheriff of Uinta County. The case was tried in the United States Circuit Court, and on the basis of the provision in the Bannock treaty was decided in favor of the Indians. The State, however, appealed the case to the Supreme Court of the United States, which, in February, 1896, handed down a decision (Ward v. Race Horse) to the effect that the admission of Wyoming as a State in 1890 acted as a repeal on that clause in the treaty which prevented the State

from enforcing its laws against non-residents. Otherwise, the State of Wyoming would not have been admitted on the same footing as the 13 Original States. This decision checked somewhat the hunting by non-residents, but apparently was not effective, for in 1899 the license fee was raised to \$40 (Laws 1899, Chap. 19), and in 1903 (Laws 1903, Chap. 44), to \$50, at that time the highest non-resident license in the United States. The rate has not prevented hunting by non-residents, though it has acted as a protection against indiscriminate hunting by certain classes of hunters from outside the State.

At present the open season for the hunting of the Jackson Hole elk is from September 15 to November 15. The State Game and Fish Commission, however, may suspend the open season if there is threat of extinction. The bag limit is one elk. Hunters are required to make a sworn statement showing whether or not any game animals have been killed, the number and sex of each kind, and the time and place of killing. Non-resident hunters pay a license fee of \$50 and must be accompanied by a guide. The resident fee is \$2.50. The sale of all game is prohibited. The Justice of the Peace, however, may issue tags under affidavit that game was lawfully captured or killed, which permits the sale of all except the edible portions.

WINTER FEEDING MEASURES

Serious losses to the elk first became apparent in the unusually severe winters following the time when the animals were cut off from their winter quarters on the Green River drainage and began to collect in Jackson Hole. One of the first of these disastrous seasons of which there is any record occurred about 1882, another occurred in 1886 or 1888, another in 1899, and the most severe of all in 1909-10. Still another disastrous winter was that of 1919-1920, which wiped out about one-half of the herd. In 1909-10 elk were dying by thousands, and the settlers in Jackson Hole, largely through information disseminated abroad and the aid of photographs taken by S. N. Leek, succeeded in inducing the State Legislature to make an appropriation of \$5,000 for feeding the animals.

Feeding in severe winters had begun, however, before the State appropriation became available. Twenty years ago, in March, 1907, about 200 elk were snowbound on Willow Creek, near Pinedale, and the warden was urged to provide for feeding the animals to keep them from starving. No funds were available for the purpose, but the Supervisor of the Teton National Forest succeeded in securing contributions sufficient to provide the necessary hay. At the time that the appropriation of \$5,000 for feeding the elk became available, in 1909, the State game warden reports that there were fully 20,000



Photograph by S. N. Leek

The annual counts show that from 31% to 59% of the herd occupy Jackson Hole during the winter months. With the present elk refuges and feeding grounds at Jackson enlarged by the purchase of the lands recommended this percentage of the whole herd can be safeguarded under the most adverse conditions

animals in the settled part of Jackson Hole. Very few adult elk died that season, but the losses among the calves amounted to about 15 per cent. Prompt action on the part of the settlers in beginning feeding before the appropriation became available undoubtedly did much to prevent greater losses. About 300 elk were also fed by forest rangers for several days in April at the big bend of Green River on hay purchased from the balance of the fund raised by subscription in 1907. (Rept. State Game Warden, 1909, p. 6.)

In March, 1910, reports of starving elk were sent out from Jackson Hole, and in consequence the Governor, the State veterinarian, the food commissioner and the game warden made a visit of investigation to Jackson. When the party arrived, warm weather had improved conditions to such an extent that relief measures were found unnecessary. The usual number of elk died in the valley, while losses elsewhere were reported below the average.

In the following winter, 1910-11, the normal number of elk came down to the valley, but somewhat earlier than usual, and before the winter was half over the herd suffered great loss.

At the same session of the legislature at which the first fund was provided for purchasing hay, a memorial was passed requesting Congress to cooperate with the State of Wyoming by making an adequate appropriation for "feeding, protecting and otherwise preserving the big game which winters in great numbers within the confines of the State of Wyoming." In response to this memorial, Congress, on March 4, 1911, appropriated \$20,000, which was made immediately available for feeding the elk and making a preliminary investigation as to possible methods of relieving the situation or transferring some of the animals elsewhere. The Biological Survey was placed in charge of the work and sent its representative to Jackson. In the meantime feeding under the direction of the State had begun about February 15, but the amount of hay available was only about 250 tons.

Following a prolonged summer drought, which curtailed the growth of forage throughout the region, the winter of 1919-1920 was unusually long and severe, and thousands of elk, probably one-half of the total herd, died of starvation. In addition to the stock of hay on hand at the Federal Elk Refuge, the State of Wyoming provided about 500 tons of hay and a carload of cottonseed oil cake. An emergency purchase by the Biological Survey in January of 573 tons of hay at a cost of over \$36,000 prevented greater disaster to the herd.

Feeding has continued uninterruptedly since 1909, with the exception of two years, 1915 and 1926. As a rule, it extends from early January until late in March or early in April, an

average of less than three months. The shortest period was 22 days, in 1919, and the longest about 90 days, in 1912 and 1923. The latest dates on which feeding ceased were April 15, 1912; April 21, 1913, and April 25, 1923.

The amount of hay fed since appropriations were provided by the State or Federal governments has varied, with the exception of 1919 and 1921, from about 500 tons up to 1,900 tons, the latter amount being fed by the State and the United States Department of Agriculture in 1920.¹ The number of elk fed during any one season varied from about 3,000 in 1919 up to 10,000 the previous year, the number fluctuating in accordance with the weather and snow conditions. The average is about 5,000 or 6,000 annually. The figures for the years 1912 to 1926 are shown in the following table, which is based on reports of the Biological Survey. Entries marked with an asterisk in the column showing the number of tons of hay fed indicate the combined feeding by the State and the United States Department of Agriculture.

FEEDING ELK IN JACKSON HOLE

Year	Period of Feeding	Hay Fed (Tons)	Elk Fed
1912	January 14-April 15.....	920*	7,250
1913	February 15-April 21.....	500	4,000
1914	January 30-March 28.....	550	6,150
1915	No feeding.....
1916	January 12-March 27.....	1,000*	8,000
1917	January 15-April 5.....	1,060*	6,000
1918	February 7-April 8.....	890*	10,000
1919	March 5-March 27.....	164	3,000
1920	December 27, 1919-April 20.....	1,900*	8,000
1921	January 19-March 18.....	225	3,500
1922	January 4-April 24.....	1,200*	4,300
1923	January 23-April 25.....	955*	3,400
1924	February 4-April 9.....	565*	4,800
1925	January 5-March 28.....	1,189**	5,500
1926	No feeding.....

REFUGES

Several proposals have been made from time to time for establishing game refuges for elk in Jackson Hole in addition to the proposed southward extension of the Yellowstone National Park. Without going into unnecessary detail and without referring to the State game refuges east of the park or in other parts of the State, it may suffice to mention five of these projects. Two of them never advanced beyond the

¹Approximately 7 pounds of hay per day per animal are required, or a total of 630 pounds per animal for the severer winters.

*Combined feeding by Biological Survey and State.

**Also by Izaak Walton League.

stage of discussion; the other three have become accomplished facts. These five projects are as follows:

1. Proposed winter game preserve on the Red Desert.
2. Teton State Game Preserve, established by the State in 1905.
3. Proposed winter refuge on the Gros Ventre.
4. Winter Elk Refuge, established by the Federal Government in 1912.
5. Izaak Walton League Winter Refuge, established in 1925 with funds raised by the League.

In 1898, Dr. Frank Dunham published in *Recreation* (Vol. IX, p. 271, Oct., 1898) a proposal for a winter game preserve on the Red Desert, north of Green River, Wyoming. This preserve was to be located in the northern part of Sweetwater County, between the twelfth guide meridian on the east and the thirteenth guide meridian on the west, the fifth standard parallel on the south and the southern boundary of Fremont County on the north. With this winter reserve was a proposed refuge, including most of Jackson Hole and taking in all the region west of a line extended southward from the eastern boundary of the Yellowstone Park almost to Cora, Wyoming. The winter game refuge and the Jackson Hole refuge were to be connected by an elk trail, as shown on a map published with the article. This proposal was based on the recommendation of a veteran guide and sportsman, Ira Dodge, of Cora, Wyoming, who reported that twenty thousand elk passed his place in the fall bound for the area within the proposed winter range. This project never advanced beyond the state of a proposal.

At the session of 1905 the Legislature of Wyoming passed an Act creating the first State game refuge immediately south of the Yellowstone Park. This refuge, now known as the Teton State Game Preserve, comprised some 570,000 acres, extending from the Idaho boundary eastward to the Continental Divide and from the Yellowstone Park southward to the Buffalo Fork. The Teton was the first, as it has remained one of the largest, of the game reserves in the State, and although its boundaries have been modified several times the main area has now been a refuge for more than twenty years. Later, the section west of the summit of the Teton Range was eliminated, as there was not enough big game left in that section to warrant its continuance as a refuge; and still later the eastern area was extended to the southeast along DuNoir Creek, the valley of the upper Yellowstone immediately south of the park was opened to hunting and other changes were made.

In his annual report for 1907 the State Game Warden of Wyoming recommended that six townships of public land on



Photograph by U. S. Forest Service

There are circumstances under which feeding hay is necessary. More feeding alone, however, does not solve the difficulty for its provision simply means more elk. All that it could accomplish would be to remove the difficulty for two or three years until the elk had time to multiply once more to the danger point

the Upper Gros Ventre be set aside as a winter range for elk. This proposal originally included a strip of land six miles wide, extending easterly from range line 114-15 nearly to the head of the Green River Divide and also included two townships embracing the big bend of Green River. In the report of the State Game Warden for 1906 a map was published (p. 11) showing this area, an estimate was submitted that from \$45,000 to \$50,000 would be required to extinguish the private claims, and a recommendation was made that Congress be asked to donate the land to the State. In the following year, on February 16, 1909, the Legislature of Wyoming passed a resolution (H. J. Memorial No. 2. See Ann. Report State Game Warden, 1909, p. 9) urging Congress to grant the State of Wyoming six townships of land, namely, Townships 41 and 42, R. 111 and 112 W., and Township 42 in R. 113 and 114 W. of the Sixth Principal Meridian. The area outlined in the resolution differed slightly from the first proposal, but included six townships. The passage of this resolution met opposition. Strong protests were made and the scheme was abandoned, although in later years provision was made for protecting the winter forage for elk on part of this area through grazing regulations promulgated by the Forest Service.

As a result of preliminary investigations made in Jackson Hole in the spring of 1910, following a hard winter and severe losses of elk by starvation, recommendation was made to Congress for the purchase of lands in Jackson Hole on which hay could be grown to feed the elk. An item of \$45,000 was included in the Agricultural Appropriation Bill passed by Congress August 10, 1912, and \$5,000 additional was included the succeeding year. With this appropriation of \$50,000, 1,760 acres of land immediately north of Jackson was purchased, and with 1,000 acres of adjoining public land a refuge of 2,760 acres was established under Act of Congress of August 10, 1912, and March 4, 1913, and by Executive Orders of 1915 and 1916. In 1925 the Izaak Walton League of America purchased 1,760 acres of land in Jackson Hole, and in 1927 Congress authorized acceptance of title to this area as an addition to the nearby Federal refuge. The total area of the elk refuge, therefore, is slightly over 4,500 acres.

RELATION BETWEEN SUMMER AND WINTER ELK RANGES

The habitat and environment of the Jackson Hole elk have been permanently modified. The high mountain summer ranges in the Teton National Forest and along the southern border of the Yellowstone National Park, embracing more than two million acres of land, 570,000 acres of which is within a State Game Refuge, are unaffected by settlement and continue to afford what are regarded as ideal conditions for the

welfare of the herd during spring, summer and fall. But, as has been pointed out, settlement has occupied the flats and valleys. These areas comprise the natural winter ranges. Therefore, the seasonal ranges are now disproportionate in food supply and are no longer complementary.

With the advance of snow in the fall the animals drift down to the lower ranges of Jackson Hole, the North Fork of the Buffalo, the Gros Ventre and the Hoback Rivers, and a high percentage of the cows over two years old are flanked by calves. If the winter conditions are favorable the yearlings and weaker animals in general carry through; and the herd, slowly following the retreat of the snow in the spring, again occupies the higher ranges. The cows are then with calf and soon these are dropped. And so the herd is augmented with each favorable season and may even double in size within four years. Such an increase occurred between 1921 and 1925.

The summer ranges remain adequate, but with each year of increase in the herd the tax on the winter ranges becomes greater. Inevitably, then, there comes a point, marked by a severe winter, when the animals have multiplied beyond the supply of winter forage. The starvation and death of thousands ensues, as in the disastrous season of 1919-1920.

ESTIMATES OF THE NUMBER OF ELK

The first count of elk in Jackson Hole was made by the United States Forest Service in 1912, but estimates of the herd were published at intervals previous to that year. These estimates were usually based on reports of trappers or hunters who had opportunities of making observations on the ground, and while differing from an actual census were made by persons familiar with the elk, many of them in a position to judge with fair accuracy the relative numbers in the herds in the Yellowstone Park and in Jackson Hole. For these reasons these estimates are valuable as indicating the relative size of the herd at the time and are the only figures available for the early years. In 1887 a correspondent of *Forest and Stream*, stated that a hunter and trapper, who had wintered in Jackson, later reported that 15,000 elk had wintered south of the Park in the valleys of the Shoshone and Snake rivers. While this number was considered somewhat exaggerated, yet it indicated that there were a great many animals in the valley. He also reported that settlers were compelled to drive the elk off the range so that their stock could secure feed (*Forest and Stream*, Vol. XXIX, p. 88, August 25, 1887). In the report of the Yellowstone Park for 1899 it was estimated that the total herd numbered about 60,000, of which possibly half represented the southern units, including the elk in Jackson Hole.

Following the 1912 count of the herd, the Forest Service undertook the systematic recording of the numbers of elk:

SUMMARY OF ELK COUNTS

March, 1912—	
By Forest Service.....	13,528
March, 1916—	
By Forest Service.....	19,763
March, 1921—	
By Forest Service, Biological Survey and State of Wyoming....	9,346
February and March, 1925—	
By Forest Service, Biological Survey and State of Wyoming....	19,493
February and March, 1927—	
By Forest Service, Biological Survey and State of Wyoming....	19,238

Changes in the number of animals in the herd are almost entirely due to snow conditions affecting the availability of sufficient food supply. In the period 1912-1916, during which a succession of easy winters and favorable snow conditions obtained, a considerable increase is noted. The hard winter of unfavorable snow conditions in 1919-1920, when many elk are known to have starved, is reflected in the reduced number counted in 1921. A doubling of the numbers between 1921 and 1925 would seem to suggest the expectation of a continued increase. For reasons not known, this has not occurred although recent winters have been favorable and, according to the best information available, comparatively few elk have been killed by hunters.

These counts, extending over a period of fifteen years, reveal the percentage of the total herd which frequents definitely known areas during the winter months and also the approximate percentages of different classes of animals. The following tabulation shows these data:

Year	Jackson Valley Feed Grounds and Vicinity		Gros Ventre (Winter Range)		Scattered (Winter Range)		Total Number
	%	Number	%	Number	%	Number	
1912	59	8,001	24	3,240	17	2,288	13,528
1916	38	7,472	32	6,273	30	6,018	19,763
1921	45	4,233	24	2,273	31	2,840	9,346
1925	31	5,996	47	9,128	22	4,369	19,493
1927	46	8,832	29	5,543	25	4,863	19,238
Aver.	42	6,906	33	5,291	25	4,076	16,273

It is known, then, that from 31 per cent to 59 per cent of the herd occupy the Jackson Hole feed ground and the immediately contiguous territory during the winter months where, in case of necessity, they can be fed hay; that from 24 per cent to 47 per cent of the total herd occupy winter range on the Gros Ventre River; and that from 17 per cent to 31 per



Photograph by U. S. Forest Service

Note the condition of this animal. What is needed is recognition of the simple fact that the elk will multiply beyond their means of subsistence, and that if their numbers are not reduced in some other way they will be reduced by starvation and disease. The herd must be kept stationary and held at a number commensurate with available or possible food supply

cent of the total herd are scattered in relatively small bunches in outlying localities. The averages are:

Jackson Hole feed grounds and vicinity.....	42 per cent
Gros Ventre winter range.....	33 per cent
Outlying districts.....	25 per cent

LOSSES FROM CAUSES OTHER THAN STARVATION

Approximately 900 elk are reported killed legally by hunters. This is an estimate due to the failure of hunters to make complete returns, although required to do so by State law. In years gone by wanton destruction of elk for their tusks and for coyote bait was an important factor in the decrease of the herd. Of late years this loss has been reduced to a minimum.

How much of the annual loss is due to natural causes other than starvation is as yet undetermined. Loss from predatory animals has not been determined with any degree of certainty, or rather it has not been determined that predatory animals are responsible for the loss of any very great number of elk. Coyotes are the most numerous of the so-called predatory species and known instances of coyotes attacking elk are rare. It is hardly probable that coyotes attack and kill adult elk. That they kill some of the very young calves and weak and starving animals is probable. Wolves and mountain lions are known to be exceedingly destructive of elk as well as other game animals. But these are very scarce in the present range of this elk herd, and the methods employed by the Biological Survey will no doubt keep their numbers in control.

Though predatory animals have in the past made serious inroads in the elk herds, there is no evidence that they do so now. On the contrary, the rapid increase that has usually taken place in the number of elk during the years when starvation conditions did not obtain indicates that the loss from predatory animals is not serious.

GENERAL ECONOMIC CONDITIONS IN RELATION TO THE ELK HERD

The Jackson Hole elk bear an exceedingly important relation to the local stock raising, farming, recreation and general community interests of Teton County, Wyoming. They provide a market for surplus hay and afford employment for local residents, are the basis of a considerable local business in outfitting and guiding hunting parties and furnish local residents an economical and desirable source of fresh meat supply.

These elk are also of very great economic importance as a part of the whole scheme of things, which makes northwest Wyoming and the Jackson Hole a mecca for tourists, recreationists and big-game hunters. Indeed, it is believed that when the elk herd is made secure against periodical losses by starvation and is managed in a businesslike way, its value as an

economic asset will be greater than that of any other local industry.

Proper management of the elk involves consideration of the use now made of the range by domestic stock. The ultimate objective of the conservation of the elk is to establish their full community and national value. The great attraction of the elk is as a recreation asset maintained as nearly as possible under natural conditions. Unless the herd can be maintained under such conditions the Jackson Hole region will lose its chief claim to distinction and its greatest source of potential income from tourists and sportsmen. Without this extraordinary exhibition of wild life, this region, even though of unusual scenic charm, would need to compete with hundreds of similarly beautiful regions in the West.

It is wholly practicable to provide properly for all of the essential industries of the Jackson region, which are dependent upon the use of the range. The maintenance of wild life, particularly the elk, is included as one of these essential industries. Much has been accomplished by the Forest Service in stabilizing the livestock industry through its plans of range management. There remains the necessity of stabilizing the conditions surrounding the welfare of the elk. With the cooperation of the responsible agencies—State and Federal—there is no reason why a plan of management cannot be developed which will give just recognition to all essential interests.