MINUTES OF ANNUAL MID-WINTER MEETING AND FIELD TRIP OF THE GREAT LAKES DEER GROUP, SAULT STE. MARIE, FEBRUARY 15,16,17,1955.

The meeting began at 7:30 P.M. on February 15th., with opening remarks by chairman Krefting in which he welcomed those present at the meeting and expressed pleasure at the large attendance. He then introduced Mr. Herridge, District Forester, Department of Lands and Forests, Sault Ste. Marie, Ontario.

Mr. Herridge extended to all those present, especially to the large representation from the United States, a very hearty welcome on behalf of the Province of Ontario, host to this year's meeting. Mr. Herridge suggested that the large number of Lands and Forests people present at the meeting, carrying a host of different titles, might lead to confusion among the American visitors. He therefore explained in some detail the organizational frame-work of the Ontario Department of Lands and Forests, indicating where each of the classifications of wildlife workers fit in.

After each person attending had risen to introduce himself, the scheduled program got under way with brief reviews of past deer seasons as follows:

WISCONSIN (JAMES B. HALE): -

The 1954 Wisconsin season, as all others since their last "any deer" season 1951, was of seven days duration with bucks with forked antlers or better being legal. During the November 20th-26th period approximately 250,000 hunters shot 19,877 bucks (an increase in kill of approximately 4,000 over the previous season.) Hunting success was about 5% on opening day but dropped to 2% for the remainder of the season. As is often the case, hunting pressure was not distributed evenly. There were 7 hunting fatalities during 1954 season. Considerable data was gathered concerning the composition of the kill of more than 2,000 bucks;

Wisconsin (James B. Hale) - cont'd:

38% were yearlings.

Running concurrently with the state-wide Buck Season was the special "any deer" season on the Apostle Islands, Detroit Island and Rock Island, designed to reduce extreme over-population in those areas. Very heavy kills, reaching the extreme high of 62 deer per square mile, resulted from this special season. The necessity for such heavy kill is clearly evident from the age-weight relationships. For animals killed on the Apostle Islands, average weight of bucks was 125 pounds, does 90 pounds and fawns weighed only 45-50 pounds.

MINNESOTA (VERN GUNVALSON)

In 1954 Minnesota had its' usual 9-day "any deer" season, beginning on November 20th. Warm, dry weather produced poor hunting conditions during the first four days of the season but wide-spread snow on the fifth day improved conditions considerably. A total of 175,000 hunters bagged an estimated 50 to 60,000 deer to produce lower-than-normal hunting success figures. Thus, the success figure for Minnesota continued the decline they have shown for the past three years. Only one hunter fatality was recorded.

In general, the people seem to be reasonably well satisfied with the "any deer" season in Minnesota. However, some groups are exerting pressure to return to the previous system of closure on alternate years.

Approximately 3,000 deer were examined at four checking stations. The age and weight samples thus collected appear to substantiate previous assumptions regarding winter range conditions.

Minnesota has at least 40,000 square miles of deer range. Much of this is more or less inaccessible and hence lightly hunted, while some easily accessible areas are over-hunted.

ONTARIO (HARRY LUMSDEN):

Varying conditions of accessibility, hunter density and quality of range in Ontario make necessary a variety of opening dates and season lengths. At the northern extremity of deer range in Ontario the season is open each fall for a period of forty days as against four days for the agricultural areas in the south. The most important deer range in the province has an annual open season of 12 days duration. All seasons are for any deer.

An estimated 100,000 hunters, of which 8,000 were non-residents of the Province, enjoyed a better-than-average season. Hunter success varied from 73% in the western region through 37-42% in the Sault Ste. Marie and Sudbury areas to 30-35% south of the French anf Mattawa Rivers. Two hunting fatalities were reported.

An age sample of 5,000 deer indicated a good fawn crop in the east but a much poorer one in the west where young of the year made up only 15% of the kill. It is believed that a heavy snow fall in May caused unusual mortality among fawns in the Kenora and Sioux Lookout areas.

Average weights were as follows:

Age	Male	Female
½	65-68	63
1½	110	99
2½	140	110
3½	177	110

MICHIGAN (I.H.BARTLETT):

Michigan's 16-day buck season, beginning November 15, drew 100,000 to 110,000 hunters to the Upper Peninsula where they killed approximately 25,000 bucks. Although this kill is about normal for the U.P., it fails to reflect an estimated 16% increase in deer numbers.

Michigan (I.H. Bartlett) Cont'd:

The northern part of the lower Peninsula was hunted by 304000 hunters who took 30,000 bucks during the regular season. An additional one day "any deer" season on December 1st produced an additional 9,400 deer for 44,000 hunters.

In the southern Agricultural area 20,000 hunters took 1,500 deer.

Over-all hunter success was approximately 15%.

The upper part of the Lower Peninsula contains Michigan's worst "deer slums", even though hunting pressure appears heavy (52 hunters per square mile in Roscommon County). Special seasons during the past three years have been aimed at moderate herd reduction. In 1952 an extra 100,000 deer were harvested during a special 3-day doe season and in 1953 an added 26,000 deer were harvested in a one-day "any deer" hunt. These special seasons have been moderately successful in achieving their goal but the herd has still not been sufficiently reduced to allow any real improvement in the winter range.

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Following the above presentations, Robin Hepburn indicated on a map the areas to be visited in the field on the following morning and explained their significance.

The last item on the evening agenda was the showing of the film "MICHIGAN DEER STORY", kindly provided for the occasion by the Michigan Department of Conservation. This excellent film was the subject of many favourable comments as the meeting adjourned for the day.

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The field trip on Wednesday morning, February 16th, included visits to two portions of the large Batchawana yard, which forms a narrow strip along several miles of the shore of Batchawana Bay, Lake Superior. The deer whose summer range consists of the rugged, hilly uplands of that area are driven by deep snow to the relatively sheltered (meteorologically) confines of the Batchawana yard for varying periods each winter. Winter starvation has frequently been reported during the half-century history of the Yard. Evidence of heavy use in past years was clearly visible. However, it was apparent that the depths of snow obtaining up to the middle of February had not been sufficient to cause heavy current use of the concentration area. As a result much highly palatable food remained uneaten in this very productive forest type.

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The remainder of the general meeting (Wednesday evening and Thursday morning) was devoted to presentations by discussion leaders as indicated on the attached agenda.

BROWSE ANALYSIS
by
HERMAN OLSON

Mr. Olson discussed the organization of the United States Forest service and indicated that its' prime function was that of the management of land. Thus, the main interest of the Forest Service in game species was in their forest habitat and, therefore, considerable effort had been expended in studying deer browse. The main techniques used in this has been Aldous deer browse survey method and censuses based on pellet-group counts. In the process of surveying damage to forest reproduction by deer in Wisconsin, some pellet group counts were made in central Wisconsin

and the Nicolet National Forest. Figures obtained from these counts permitted an estimate of 30,000 dear on the Nicolet Forest.

Combining the two types of survey (census and browse) offers opportunities to study the effects of browsing by deer whose approximate population densities can be estimated. The abundance and degree of utilization of food species is recorded by the standard Aldous method on 1/100th acre plots, while the pellet group count is made in the same location on a 1/50th acre plot. Plots are positioned as clusters of five along a twenty chain strip. After the total number of plots for a particular survey has been determined, their distribution is stratified by subtypes and the individual plots are positioned mechanically, prior to entering the field. Data for each plot are recorded on I.B.M. cards to facilitate analysis.

In 1952 a repeat survey on old burn in the Iron River district indicated a reduction in the number of deer using the area and a corresponding reduction in browse utilization. It also indicated a 6½% annual decrease in available browse, suggesting that after 10 to 15 years a burned area may be less productive of food for deer.

Following a special 3-day "any deer" season on the Lower Peninsula a survey of this type was conducted on 1,500,000 acres. The following population levels were calculated:

Lake County - 11 deer per square mile

Houghton County - 11 deer per square mile

Mio area - 27 deer per square mile

Grand Traverse County - 20 deer per square mile

Browse Analysis (Cont'd)

In this survey the results of the browse study were not consistent with the results of the population study. This may have been due to some of the observers being insufficiently trained.

The following census results were obtained in other areas: In the Spring of 1953 the population level was estimated at 11 deer per square mile in Lake County. After additions to the population contributed by 1953 fawn crop and subtraction of 2½ bucks per square mile killed by hunters, the 1954 census indicated 19 to 20 deer per square mile. Although these figures seem to be potentially consistent, deer drives in the same area gave population estimates at 30 to 40 deer per square mile. Population estimates made by the Pellet group method in the Mio area indicated 20 deer per square mile in both 1953 and 1954, although an "any deer" season had permitted a heavy harvest in the interval. Again, these figures are potentially consistent.

Mr. Olson felt that population estimates based on pellet group counts could be very useful. He suggested, however, that census surveys and browse surveys should be conducted separately.

CARRYING CAPACITY
by
I.H. BARTLETT

Some methods of determining the carrying capacity of an area for deer has long been one of the greatest needs in the management of this species. On the whole, neither analyses of carrying capacity nor estimates of population levels have been satisfactory in the past. In Michigan deer are now reaching the limit of summer carrying capacity in some areas but in general the prime concern is over carrying capacity throughout the winter months.

Carrying Capacity (Cont'd)

Mr. Bartlett discussed some of the many existing definitions of the term "carrying capacity" but noted that all included or implied the phrase "maximum number of deer which can be carried throughout the year". If management by hunting can be said to consist of shooting off the annual surplus (the difference between actual populations and carrying capacity) the obvious problem is that of determining the carrying capacity of the area.

In Wisconsin a very productive area carried one deer per acre experimentally, while at Cusino it had been demonstrated that good areas might carry up to 2 deer per acre.

Mr. Bartlett then referred to a graph showing the levels of abundance of Michigan deer, season by season, for the past five years. Population changes were attributed to increase at fawning season and subsequent decreases through fawn mortality, hunting losses, starvation and other winter losses. The figures plotted in the graph varied between 550,000 to 200,000 deer in the northern part of the lower Peninsula during the 5 year period. Mr. Bartlett concluded that the carrying capacity of the 14,000 square mile area involved, was approximately 200,000 deer. Estimating annual increases on the basis of 1½ fawns per adult doe, annual surpluses would be in the order of 100,000 deer of which approximately 50,000 might be harvested by hunters and the remainder lost through natural causes.

RANGE APPRAISAL
by
R.L. HEPBURN

A copy of the paper discussed by Mr. Hepburn is appended.

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In the evening of Wednesday February 6th, while the majority of those present enjoyed a number of films shown by Mr. Ponsford, representatives of the Lake States and Ontario attended the annual business meeting of the Great Lakes Deer Group. Under the chairmanship of Larry Krefting, the meeting decided that the 1956 mid-winter session of the Great Lakes Deer Group would be held at Grand Marais, Minnesota. Dates were set, tentatively, as February 14,15 and 16. Field trips would include examination of the Jonvick Yard where a number of deer exclosures have been in operation for several years and where other browse studies are in progress. It was suggested that the following topics be discussed as indicated:

1. Public relations (H. Lumsden)
2. Habitat management, including the use of herbicides. (B. Jenkins)
3. Methods of evaluating habitat (J.Hale)
4. Browsing tolerance (L. Krefting)
5. Aging of jaws (D. Switzenberg)

Mr. M.H. Stenlund, Ely, Minnesota was elected Secretary for the coming year. A plan was adopted whereby a new secretary will be elected, annually, from the area in which the meeting of that year is to be held.

HUNTING STATISTICS
by
JAMES B. HALE

A copy of the paper discussed by Mr. Hale is appended.

REPRODUCTIVE RATES
by
DON SWITZENBURG

Because of the necessity of obtaining information relating to this important subject, Michigan has, for several years, made embryo counts

on all female deer available from road kills, starvation etc. The following tables and comments are the result of this examination:

RESULTS OF EMBRYO COUNTS
1951 - 1954

REGION I (Upper Peninsula)

Year	2	3	4	5	6 & over	Average for all Classes £
1951	1.00(6)	1.33 (6)	.50 (2)	.86 (7)	.90 (10)	.97(36)
1952	1.41(17)	1.59 (17)	1.70 (10)	1.27 (11)	1.57 (7)	1.49(69)
1953	1.56(18)	1.56 (16)	1.67 (6)	2.00(1)	2.00 (4)	1.34(52)
1954	1.21(29)	1.80 (15)	1.60 (5)	1.00 (7)	1.15 (13)	1.39(96)
Number	(70)	(54)	(23)	(26)	(34)	(253)
Average	1.33	1.61	1.57	1.12	1.26	

REGION II (Northern ½ of Lower Peninsula)

Year	Area E (Starvation)	Balance of Region II
1951	1.18 (40)	1.43 (68)
1952	1.56 (39)	1.54 (61)
1953	1.43 (14)	1.79 (24)
1954	1.20 (40)	1.75 (51)

Region III (Southern ½ of Lower Peninsula)

Year	1	2	3	4	5	6 & Over	Average for all age Classes £
1951							
1952	.83 (6)		2.17(6)				2.10 (10)
1953	.86 (7)	1.38 (8)£					1.44 (16)
1954	1.17 (18)	2.07(14)	1.83(6)				2.00 (24)

£ Totals and averages do not include 1-year age class
£ One "litter" of 4 fawns in 1953 to a 2-year old doe

NOTE: Numbers in parenthesis refer to total specimens examined.

Deer Enclosure Studies have shown:

1.

Year	Fawns Born£			Breeding does		
	Total	Males	Females	Adults	Ad. Doe:Fawns	Yearlings
1952	11	6	5	11	1:1	9
1953	15	8	7	15	1:1	1
1954	20	8	12	12	1:1.7	2
1955						

£ Includes post-natal losses.

2. Suggested increase in reproductive rate in Enclosure may be due to:
   a. Annually increasing age of the does. (More does are reaching "prime" class.
   b. Series of mild winters making for better food conditions and greater breeding vigor after 1952.

3. Doe:Fawns ratio as shown in the late summer by Conservation Officer's counts:

Year	Fawns per doe	Year	Fawns per doe
1947	.60	1951	.65
1948	.62	1952	.76
1949	.70	1953	.80
1950	.63	1954	.73

Feeding Experiments in 1954 showed:

1. Deaths from malnutrition occurred most commonly in does containing twin fetuses, evidently because of the severe physiological drain on the doe from multiple pregnancy.
2. Foetuses from malnourished does were apt to be weak and underdeveloped.
3. Parturition is a limited sample of malnourished does was delayed 2-4 weeks after the normal period.
4. Late-born fawns appeared to be underweight and less vigorous.
5. Prolonged malnutrition appeared to be inhibit or delay initial milk production for several days after birth. Delayed lactation and insufficient milk may not only affect survival of fawns, but also may impair physical condition of does as well, particularly with regard to the fall rut and subsequent winter period. (See reference to Severinghaus and Cheatum above.)
6. One fawn of 1953 weighing 97 pounds gave birth to a 4 lb. 3 oz. fawn on June 18.

A Laboratory study of 66 sets of deer fetuses showed:

1. Males averaged heavier than females.
2. Singletons were heavier than twins regardless of sex.
3. Sex ratios were approximately equal among both singletons and twins.£
4. Based On Armstrongs' method, conception probably occurred November 7-December 13, with the peak on November 23.

£ On the other hand, sex ratios among foetuses from all deer reported in spring productivity checks showed a preponderance of males for all four years of 1951-54.

By way of comparison, Mr. Switzenberg quoted the following from Robinette, et al., "Fertility of Mule Deer in Utah", Journal of Wildlife Management, Volume 19, No.1:

1. Deer dying from malnutrition had a significantly lower reproductive rate in the yearling (2 year)class than those that died of "violence".

2. Condition of winter range had little influence on reproductive rate of animals older than yearlings (2 year olds) provided summer range was in optimum condition. Mature does (3 yrs. plus) can attain peak condition by the rutting season if adequate summer forage is available because much of their nutritive intake can go towards a buildup of condition. Fawns, whose growth has been retarded over winter by insufficient forage, must as yearlings (2 year olds), use most of the summer's nutritive intake for growth, with a resultant delay in sexual maturity. Condition of summer range may be of far greater importance in determining reproductive success of older does than is winter range, whereas, in yearlings (2 year olds) the two ranges may assume near equal importance.

3. Yearlings (2 year olds) as a group were less productive than older does. Two-year-olds (3-year olds) had highest incidence of pregnancy of any age group (99%) and highest fetal ratio (1.76). The prime class (4-8 year olds) had a pregnancy rate of about 94%, fetal ratio of 1.81 per pregnant doe, and an average of 1.70 for all does examined. The old group (9 plus) had a substantially lower pregnancy and fetal rate.

4. Prenatal losses were more numerous in earlier months of pregnancy.

5. Prenatal losses were slightly heavier in males (6:5), but were in line with the uterine sex ratios from 1169 live fetuses, or 111 males: 100 females. Mortality was greater among twin fetuses than among singletons.

6. Believes there is no impairment of fertility before 11-12 years of age.

Reproductive Rates (Don Switzenburg) Cont'd:

Upon request from Mr. Switzenburg, Mr. Dahlberg of Wisconsin gave the following information from that state:

> 89% of yearling does examined were pregnant, producing 1.6 fawns per doe, or 1.42 fawns per doe for all does examined, including yearlings. There is very little evidence that fawns of the year contribute to the fawn crop of the following year and this age class is not included in the above figures. One 19 year old ~~buck~~ doe examined was still producing fawns.

LIFE TABLES
by
V.E. GUNVALDSON

Mr. Gunvaldson introduced his topic by presenting the following statistics pertaining to the harvest of deer in Minnesota:

Composition of the Kill

Year	% Adults	Adult Males:Females	Fawns/doe
1942-49	72	138:100	0.70-0.82
1950	C L O S E D	S E A S O N	
1951	72	114:100	0.82
1952	76	134:100	0.72
1953	75	147:100	0.79
1954	74	122:100	0.74

In the light of other facts known about the Minnesota deer herds, these statistics, in some cases, are difficult to understand or interpret. These figures for average number of fawns per doe should

be considerably higher. Since the figures quoted are those taken from hunter's report cards, it is possible that some hunters report incorrectly, in an attempt to make themselves sound more sportsman-like. However, highway checks in 1952 substantiated the hunter reports of that year. In 1953-54 highway checks indicated that the percentage of fawns in the kill was 5% higher than that reported by hunters and gave a more even sex ratio for fawns of 106 males to 100 females.

Mr. Gunvalson suggested that the Minnesota figures could only be interpreted usefully if it was assumed that males were more vunerable than females and that 1½ year old males are more vunerable than older bucks.

In 1954 records from four highway checking stations showed that in the 1½ year class, the male to female ratio was 3 to 1 in the eastern portion of the state and 2 to 1 in the western portion of the state. Since some areas are known to have an actual sex ratio approximating 1 to 1, these irregularities would indicate that 1½ year old males make up most vunerable class in the population.

Mr. Gunvalson stressed the fact that great care must be taken in interpreting kill statistics and that there are many pitfalls which must be avoided. He pointed out, for instance, that although we usually expect a good fawn crop following a mild winter, the size of the fawn crop would also depend on the age structure of the female portion of the herd.

RESEARCH NEEDS

by
C.D. FOWLE

Division of Research,
Ontario Department of Lands and Forests.

Meeting of Great Lakes Deer Group, Feb.1955,
Sault Ste. Marie, Ontario.

"It is stranger that we are not able to inculcate into the minds of many men, the necessity of that distinction of my Lord Bacon's, that there ought to be Experiments of Light, as well as of Fruit. It is their usual word, what solid good will come from thence? They are indeed to be commended for being so severe Exactors of goödness. And it were to be wish'd, that they would not only exercise this vigour, about Experiments, but on their own lives, and actions: that they would still question with themselves, in all that they do; what solid good would come from thence? But they are to know, that in so large, and so various an Art as this of Experiments, there are many degress of usefulness: some may serve forreal, and plain benefit, without much delight: some for teaching without apparent profit: some for light now, and for use hereafter; some only for ornament, and curiosity. If they will persist in contemning all Experiments, except these which bring with them immediate gain, and a present harvest: they may as well cavil at the Providence of God, that has made all the seasons of the year, to be times of mowing, reaping and vintage."

Thos. Sprat

"The History of the Royal Society"
London, 1722, p.245 (3rd edition).

When we speak of "research needs" we ask the question: "What research do we need to undertake to answer questions for which we apparently need the answers in order to improve management?". In other words we are concerned with the immediate services which research can render to management. This must be true, since none of us can forsee what doors research may open in the future. We can only forsee the needs for research on the basis of present knowledge about deer and the current supposed requirements of management.

In these few introductory remarks I want to make two points. First, "deer research" cannot be completely effective without the guidance of a definition of "deer management". This is to say, that if management is to profit from research, management must have a clear view of its objectives which will point the way to the problems of research. Second, not all research on deer should be related to the requirements of management. The history of research shows us that few really novel ideas have been produced by sticking to the immediate problems. We need a proportion of workers whose course is not guided by the presumed requirements of management, who are free to consider new and possibly radical ideas based on a purely intellectual approach.

These two points may be emphasized in a slightly different way by saying that in general research supplies ideas in two contexts. Some kinds of research produce ideas which are the basis for action, but the bulk of research supplies ideas as a basis for understanding. The distinctiond I have been making should not be confused with those made as between applied and fundamental research. In relating research to the requirements of management we are just proposing to do first things forst. Some of the things requiring immediate attention may be of a very fundamental nature, while others which will be undertaken in the other category, may be very superficial.

Perhaps you noticed that I referred to the products of research as ideas. Fact-finding is scarcely research, if it produces nothing but so-called facts. New facts are only useful when incorporated into ideas -- preferably new ones. I should say that a good deal of what passes for research today is simple fact-finding, in which facts bearing on an old idea are collected in a local context. This process merely piles up more evidence to support an already established idea. The object of

research is not to find facts, but to add new knowledge in the sense of increasing our understanding.

When we consider research needs we may look to both the requirements for improvement of research generally and the specific problem which needs solution. In looking at the general requirements I suggest that if we are to see much improvement in research we need more real scientists. The need is not for "wildlife Biologists", "wildlife technicians", or "deer specialists" but for people who have a real understanding of scientific method and its application in research. The quality of research depends on the people in it and I think you will agree, in looking over the wildlife field, that most of the people who are supposed to be doing research are, in fact, only dilettante scientists with a very narrow outlook.

The need for broadening the point of view, and in developing a rigorous scientific approach is evident. We are, for example, all too prone to make assumptions in which the wish is often the father of the thought. Have we not, perhaps, wrongly assumed that all age classes and both sexes are uniformly vunerable to hunting? We try to use census methods which are convenient, but not necessarily geared to the behaviour of the animals. Is the aeroplane a usefull tool for big game censuses? Do we know too little about the behaviour of the animals to be sure that what we see from the plane really represents the sex-ratio and population density on the ground? The considerable hocus-pocus regarding statistics is another sign that we should try to improve our point of view. Statistics procedures and, more important, "statistical thinking" is a basic function in scientific research today. Not all of us may be able to carry out the computations -- although these are frequently elementary--

but we should be able to grasp the principles of sampling, randomness, significant differences, and experimental design. It is not always practical to apply statistical procedures but that does not mean that we should abandon them as a research tool or that they are so abstruse as to be beyond mere biologists. If we do not take advantage of the statistical tools available to us we will soon fall far behind others who use them to advantage.

I suggest, also, that we might give some consideration to what constitutes good scientific reporting. When we learn that sound reporting of results of well-designed research is an integral part of the research process, we will have made a big step forward. How many of us are smothered under a mass of memoranda, progress reports, interim reports, file reports, and so on--all hastily prepared, and leaving much to be desired as far as conciseness and English are concerned? These reports are, unfortunately, regarded by some as publications in spite of the fact that most of them meet only the lowest standards of scientific writing. How much better it would be if we could establish clearly that scholarly reporting is an essential of a good piece of research work and that we are all expected to meet a high standard in setting down our results for the use of others and for the use of those who come after us.

In this connection I believe that administrators of agencies employing wildlife biologists are under some obligation to demand a higher professional standard both in the execution of research and in reporting. A scientist's training should not end when he leaves university. Employers of research scientists could do much by providing the necessary "atmosphere for research" and by reaping the profits from it by demanding a really professional standard of work.

There are, no doubt, other suggestions that could be made for the general improvement of wildlife research, but the examples I have given will probably suffice for our present purpose.

We may now turn to some of the problems which seem to be demanding the attention of research at the moment.

We might define deer management as the process of producing from the land for an indefinite period, sustained annual crops of deer of given quality within the capability of the environment to support deer, without deterioration in their quality, or in the power of the environment to support them. This must be done in a manner consistent with the land-use practices within the area under consideration. This is a dynamic concept.

By what procedures are we to achieve efficient management?

1. The definition infers an ability to increase or decrease the population, and incifentally an ability to measure it.
2. It infers an ability to assess the environment to determine how many deer it will carry.
3. It speaks of quality of animals inferring that we can define the quality we require and maintain it.
4. It speaks of cropping and infers an ability to determine how and when such cropping should be done.

We cannot deal with all aspects suggested by these four points, but I can suggest a few things which urgently need attention.

With respect to inventory, there is a great need for an improvement of methods which are actually geared to the behaviour of the animals concerned. (Here Mr. Passmore commented on the work done on moose censusing from the helicopter).

When it comes to the assessment of the environment there seems to be an undue emphasis on food. We really should try and evaluate the critical factors affecting populations from a more balanced point of view. It may turn out that the factors controlling populations in different areas are different and may vary with time.

When considering quality of the animals we are producing we require a set of criteria. I was most interested in Mr. Bartlett's discussion in which he presented the evidence suggesting that one region in Michigan might be expected to carry about 200,000 deer. I wonder if the deer which he is talking about are the same quality of deer which we might be considering in Ontario or in some other states. (Here Mr. Cringan made some comments with respect to the effects of hunting in selecting various genetic strains of moose and the subsequent effect of this on the size and quality of antlers.)

Probably the greatest requirement when it comes to harvesting the crop is for improvements in our public relation methods. There is a need for a careful scientific study of the hunters themselves which might best be done by psychologists, sociologists, or others acquainted withhuman behaviour. We must learn how to transmit what we know to the sportsman. (Here Mr. Lumsden made comments on suggested approach for public relations.)