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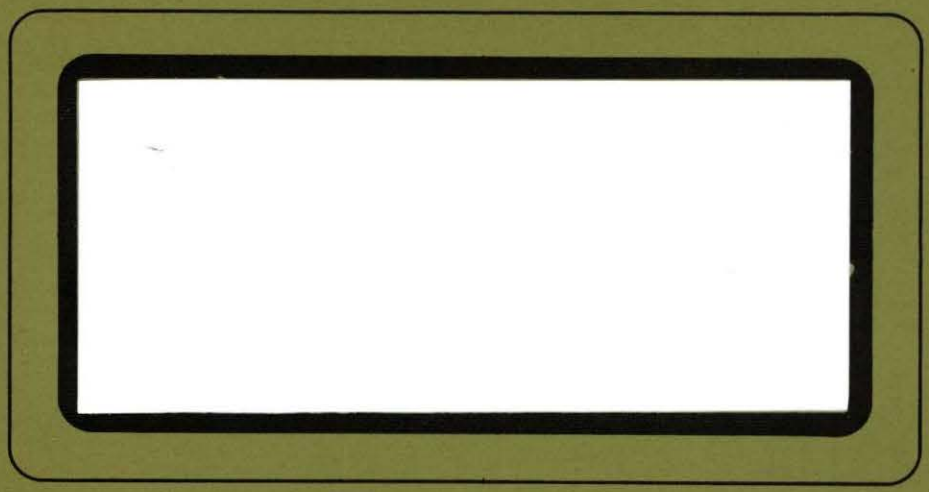


1987

SEC

#6

ESTIMATE OF THE DEER POPULATION

IN THE

SKAGIT RIVER WATERSHED

MINISTRY OF ENVIRONMENT & PARKS

JANUARY, 1987

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

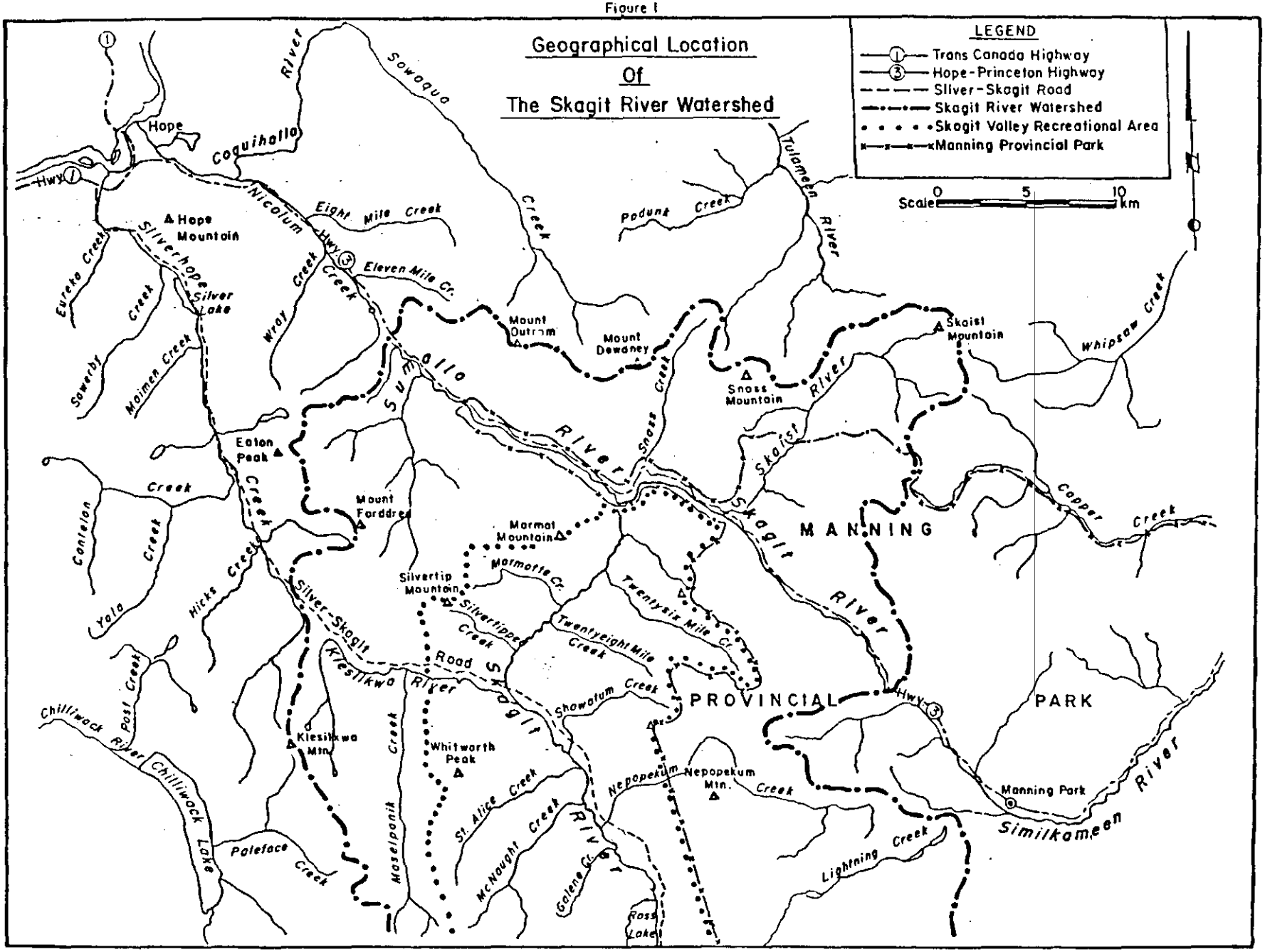
In January, 1986 the Skagit Endowment Commission approved funding of a proposal by the Fish & Wildlife Branch of the then Ministry of Environment to conduct a series of wildlife studies in the Skagit River watershed. The primary objective of the various studies was to update the data base for certain wildlife species (Barnard, 1986). Among the studies subsequently undertaken was the determination of the size of the 1986 deer population within the Skagit watershed. Black-tailed (Odocoileus hemionus columbianus) and mule (Odocoileus hemionus hemionus) deer are the primary big game species within the watershed and provide an important source of recreation for many Lower Mainland hunters (Barnard, 1987). Due to their high visibility at certain times of the year, deer are also a major attraction to non-hunting recreationists. If the deer population is to be managed to maximize these recreational opportunities in the future, wildlife managers must be aware of the population demographic characteristics. Among these is the size of the pre-and post hunting season population.

2.0 STUDY AREA DESCRIPTION

The Skagit River watershed is located in southwestern British Columbia, approximately 150 km east of Vancouver (Fig.1). Straddling the International Boundary, the entire watershed encompasses approximately 8133 km of which some 1036 km are situated in British Columbia (Whately, 1970). The Canadian portion contains an array of physiographic features including the ecotone between coastal and interior forest types (Perry, 1981). This diversity is reflected in the six biogeoclimatic zones that occur within the watershed: 1) Alpine Tundra and Mountain Hemlock 2) Alpine Tundra and Englemann Spruce-Subalpine Fir 3) Mountain Hemlock 4) Englemann Spruce- Subalpine Fir 5) Coastal Western Hemlock and 6) Interior Douglas Fir (Barnard, 1986).

A diversity of land uses have occurred in the watershed, some of which are still active today. Since early times portions of the watershed have served as a travel corridor linking the Interior with the coast, first for native Indians and subsequently for fur traders and gold miners (Perry, 1981). Today that link continues in the form of the Hope-Princeton Highway (Hwy. 3). The discovery of gold in 1859 led to attempts at mining in the watershed. Since then sporadic attempts at mineral extraction have continued. In the late 1800's and early 1900's several attempts were made to establish ranching operations in the Lower Skagit Valley. However, by 1910 the last of these attempts had failed. In the late 1930's and early 1940's construction and

Figure 1


Geographical Location
Of
The Skagit River Watershed
LEGEND
Trans Canada Highway
Hope-Princeton Highway
Sliver-Skagit Road
Skagit River Watershed
Skagit Valley Recreational Area
Manning Provincial Park
Scale 0 5 10 km
N
Hope
Hwy 1
Coquihalla River
Sowaqua Creek
Tulameen River
Nicolum
Eight Mile Creek
Hwy 3
Eleven Mile Cr.
Podunk Creek
Hope Mountain
Silverhope Creek
Silver Lake
Eureka Creek
Sowerby Creek
Maimen Creek
Wray Creek
Mount Outram
Mount Dewdney
Snass Creek
Snass Mountain
Skaist Mountain
Whipsaw Creek
Sumallo River
Skaist River
Eaton Peak
Coniston Creek
Yala Creek
Hicks Creek
Mount Forddred
Marmot Mountain
Marmotte Cr.
Silvertip Mountain
Silvertipper Creek
Twentysix Mile Cr.
Twentyeight Mile Creek
Copper Creek
MANNING
Skagit River
Silver-Skagit Road
Klesilkwa River
Showalum Creek
PROVINCIAL
PARK
Hwy 3
Chilliwack River
Post Creek
Chilliwack Lake
Klesilkwa Mtn.
Whitworth Peak
Maselpanik Creek
St. Alice Creek
McNaught Creek
Galena Cr.
Ross Lake
Nepopekum
Nepopekum Mtn.
Creek
Manning Park
Similkameen River
Lightning Creek
Poleface Creek

subsequent modification of the Ross Dam approximately 48 km below the International Boundary resulted in the creation of Ross Lake Reservoir. At full pool the reservoir inundates approximately 200 ha of the Lower Skagit Valley (Slaney, 1973). Between 1946 and 1954 most of the valley floor was clear-cut or selectively logged and has been followed by a climate-induced period of relatively slow regeneration.

Today, forest harvesting activities are the predominant form of land use, primarly in the Maselpanik, Klesilkwa, Cantelon, Yola and Sumallo drainages. No logging is permitted in that portion of the watershed within Manning Provincial Park. Additionally, future forest harvesting activities in the 32781 ha Skagit Valley Recreational Area (S.V.R.A.) will only be permitted if compatible with other resource users. This reflects recognition of the increasing role of recreation in the area generally, and in the southeast portion of the watershed in particular.

Administratively, the study area is located in Resource Management Region 2. Within that region the watershed occupies approximately the southern half of wildlife management unit (M.U.) 2-2.

3.0 METHODS

The basis for estimating the 1986-87 deer population in the Skagit River watershed is the model,

$$X = (A)(B)(C)$$

where,

X = minimum pre-hunting season population

A = total number antlered deer harvested

B = percentage (%) of antlered deer harvested

C = percentage (%) of antlered deer in the population.

This model was developed by Region 2 wildlife managers and is the primary means used to estimate the minimum pre-hunting season population level of deer herds in the region (Forbes - personal communication). The data used to determine components A, B & C of the model were collected during the late summer and fall using a variety of techniques.

3.1 Component A - total number antlered deer harvested

These data were obtained by conducting a total of 17 days of game checks in the study area (Barnard, 1987). Included in the final estimate of total antlered deer harvested were a) the number of deer actually checked b) number of deer reported as taken by hunters passing through the game check, either by themselves or their hunting partner(s), on days when the game check was not operating, and c) an estimate of the number of deer harvested on days when the check was not operating, and which were not accounted for in (a) and (b).

3.2 Component B - percentage (%) of antlered deer harvested

Field data to support this component were not available. For use in similar circumstances, Region 2 wildlife managers have developed a subjective ranking based on degree of estimated hunting pressure:

Light hunting pressure--use 5% antlered deer harvested

Normal hunting pressure--use 10% antlered deer harvested

Heavy hunting pressure--use 25% antlered deer harvested

Extremely heavy hunting pressure--use 45% antlered deer harvested

The proportion of antlered deer harvested annually during the period 1976 through 1985, based on the above ranking, was determined and then averaged to obtain an estimate for the 1986 hunting season.

3.3 Component C - percentage (%) of antlered deer in the population

This data was obtained by conducting a number of pre-hunting season counts of deer in the study area. During each count the animals observed were classified as either antlered (adult males) or antlerless (does and fawns). Where differentation could not be made the animal was recorded as unclassified (U/C). Three different methods were utilized in an effort to obtain a meaningful sample size.

3.3.1 Aerial Counts

Two aerial counts were conducted on August 25, 1986 utilizing 206-B Jet Ranger helicopter. The first count commenced approximately one-half hour after dawn and ended at 0830 hrs. The

second count commenced at approximately 1830 hrs. and was terminated by light conditions approximately two hours later. Observers were situated on both the starboard and port side of the aircraft. All observations were orally conveyed to a third individual, whose function was to record sightings on a tape recorder, assist the pilot in navigation, and make observations as time permitted. The flight route encompassed most of the study area above 1524 m.

3.3.2 Ground Counts

Ground counts were conducted on the 2-3 and 4-5 of September, 1986 respectively. One vehicle, containing an observer/driver and an observer/recorder, undertook the first count. Two vehicles, each with a similar crew as on the first occasion, participated in the second count. Each count commenced at 2000 hrs. and terminated at 0100 hrs. Each person in a slowly moving vehicle was equipped with a plug-in spotlight and these were used to scan the adjacent hillsides. Deer were usually located by the reflection of their eyes in the spotlights when they looked towards the vehicle. In an attempt to increase the likliehood of an unseen deer looking towards a vehicle, a predator call was used by one crew during the second count. During the first count only the road system in the Maselpanik Creek valley was censused. During the second count the road systems in both the Maselpanik and Klesilkwa drainages were travelled, as was the main Silver-Skagit Road from Km 36 to Km 60.

3.3.3 Parks Division Data

In the fall of 1986 it was learned that Parks Division maintenance personnel had kept a record of deer sightings while travelling the Silver-Skagit Road during the spring and summer. One Parks' source estimated that as many as 300 sightings had been recorded during that period (Cooper-personal communication). Another indicated that 135 sightings were made between Km 30 and Km 60 during July and August (St. Clair-personal communication). Each sighting was recorded as to date, location, sex (and age where applicable), and a subjective evaluation of condition.

TABLE 1: Estimated Antlered Deer Harvested from the B.C. Hunter Sample and Proportion of Antlered Deer Harvested-Skagit River Watershed, 1976-85.

Year	Antlered Deer Harvest	% Antlered Deer Harvested
1976	15	2.5
1977	10	2.5
1978	27	7.0
1979	12	3.5
1980	45	10.0
1981	53	10.0
1982	85	15.0
1983	68	11.0
1984	58	8.0
1985	61	9.0
	$\bar{X}$ =	7.8

TABLE 2: Number of Antlered and Antlerless Deer Observed During Pre-Season Counts utilizing Two Methods - Skagit River Watershed, 1986.

	Method	
	Aerial	Ground
No. Adult Males	42 (72%)	6 (17%)
No. Does and Fawns	14 (24%)	17 (47%)
No. Unclassified	2 (4%)	13 (30%)
Total	58 (100%)	36 (100%)

TABLE 3: Proportion of Classified Antlered, Adult Female and Fawn Deer Observed During Pre-Season Counts - Skagit River Watershed, 1986.

	Method	
	Aerial	Ground
Total classified deer	56	23
Percent antlered deer	75%	26%
Percent adult female deer	21%	65%
Percent fawn deer	4%	9%

RESULTS

4.1 Component A - total number antlered deer harvested

A total of 50 antlered deer were estimated to have been harvested in the Skagit River watershed during the 1986 deer hunting season (Barnard, 1987). Of this total 21 animals were checked during the 17 days on which a game check was operated. Hunters passing through the game check reported another 15 bucks that they or their hunting partners had taken out of the study area on days when no game check was present. The remaining 14 animals are those estimated to have been taken by hunters who did not pass through the game check at any time. The calculation of this latter estimate is detailed in a report on the 1986 deer hunting season in the study area (Barnard, 1987).

4.2 Component B - percentage (%) of antlered deer harvested

The estimated proportion of the total antlered deer population in the study area that was harvested annually ranged from a low of 2.5% to a high of 25% during the period 1976 thru 1985 (Table 1). As indicated in Section 3.2, these data are based on subjective rankings of hunting pressure that have been developed by Region 2 wildlife managers due to lack of quantifiable field data. Field data on the proportion of antlered deer harvested was also not available for the 1986 deer season. Therefore, the 1976 thru 1985 data were averaged to obtain an estimated proportion of 7.8% (Table 1).

4.3 Component C - percentage (%) of antlered deer in the population

A total of 58 sightings occurred during the aerial counts, whereas 36 deer were observed during the ground counts(Table 2). Seventy-five percent of the deer classified from the air were antlered, whereas this component of the population accounted for 26% of the classified deer observed on the ground (Table 3). The aerial counts also resulted in only 4% of the animals not being classified, whereas 36% of the animals observed during ground counts were in the unclassified category. No sighting data was forthcoming from Parks Division as it apparently could not be located (St. Clair - personal communication).

Both the methods yielding data appear to have serious flaws. Due to visibility problems the aerial counts were limited to the more open sub-alpine habitat, largely above 1524 m. As a result, the classified deer are heavily weighted towards mature

bucks who traditionally summer at high elevations (Forbes - personal communication). Conversely, the ground counts were primarily conducted between 518 - 1067 m elevation, and reveal a preponderance of antlerless animals. This, apparently, reflects the preference of does and fawns for the lower elevations as summer range.

It is implicit in all herd classification counts that each deer in the population must be equally likely to be classified (Connolly, 1981). However this is often not the case. In such situations there is little that can be done about the problem of differential observability of deer in various age and sex classes, other than to make counts at the season when such bias is lowest. For many herds the best season appears to be autumn. However, in the Skagit watershed, the opening of the deer hunting season during the first week of September precludes undertaking classification counts any later than occurred during this study. Indeed, the opening of the early archery season in late August may have impacted on the numbers of deer encountered during the ground counts. Local loggers had suggested prior to the counts that considerably more deer sightings than were eventually recorded could be expected(Unger-personal communication).

For reasons previously stated, the herd classification data collected in this study could not be used with confidence to estimate the deer population in the study area. In similar circumstances, involving other deer herds in Region 2, wildlife managers have subjectively used 40% as the proportion of antlered animals in the pre-season population (Forbes - personal communication). In the absence of field-derived data, the use of a 40% antlered animal component was assumed applicable to the study area deer population.

4.4 Minimum Pre-Hunting Season Population

From Sections 4.1, 4.2 and 4.3 the various components can now be utilized to calculate the minimum pre-hunting season population:

X(minimum pre-hunting season population) = (A)(B)(C)

Where A=50; B=7.8%; C=40%

Therefore;

X(minimum pre-hunting season population) =

(50)(100/7.8)(100/40)

Minimum pre-hunting season population = 1602 animals.

4.5 Minimum Immediate Post-Hunting Season Population

Deer populations in Region 2 undergo a 2% annual crippling loss as a result of hunting (Forbes - personal communication). Application of this factor to the pre-hunting season population, less the estimated harvest, results in the following calculation:

$$(1602-50) \times .98 = \underline{1521} \text{ animals}.$$

TABLE 4: Estimated Pre-and Post Hunting Season Deer Population - Skagit River Watershed 1976-86

Year	Pre-Season Population			% Unretrieved Harvest	Post-Season Population		
	Antlered Males	Females & Fawn Males	Total		Antlered Males	Females & Fawn Males	Total
1976*	599	901	1500	2.0	573	883	1456
1977*	399	601	1000	2.0	382	589	971
1978*	385	579	964	2.0	351	568	919
1979*	342	515	857	2.0	324	505	829
1980*	449	676	1125	2.0	396	663	1059
1981*	529	796	1325	2.0	467	781	1248
1982*	566	850	1416	2.0	472	834	1306
1983*	617	928	1545	2.0	539	910	1449
1984*	724	1088	1812	2.0	653	1067	1720
1985*	677	1017	1694	2.0	604	997	1601
			$\bar{X}$ = 1324				$\bar{X}$ = 1256
1986**	640	962	1602	2.0	579	942	1521

* derived from B.C. Hunter Sample harvest estimate.

** derived from calculated harvest estimate in this study.

5.0 DISCUSSION AND CONCLUSIONS

The minimum pre-season deer population is estimated at 1602 animals. At the close of the deer hunting season in mid-December, 1986, the estimated minimum population was 1521 deer. Compared to the average for the previous ten year period, the 1986 deer population in the study area is relatively healthy (Table 4). Overall, the population has remained fairly stable, except for the years 1977 and 1978 when winter weather conditions resulted in higher than average winter-kills (Forbes - personal communication). This was apparently followed by a low fawn recruitment in the spring of 1979. These combinations of factors probably account for the 1979 pre-season population of 857 animals being the lowest during the period 1976 thru 1985 (Table 4).

It is apparent from this study that there is a wide disparity in distribution, with elevation, of various age and sex classes in the study area during the summer and early fall. As a result, neither method used to classify the population in this study appears fully suitable. The aerial method works well in open terrain, such as occurs in the sub-alpine, and results in a low proportion of unclassified animals. It also readily accesses areas that would be difficult to census from the ground. However, the method does not work well at lower elevations where vegetative cover is often continuous. The end result is that data obtained with this method tends to be heavily weighted to mature bucks. The standard night ground counts are dependent on road access for implementation. Most of the road access in the study area is located below 1067 m and is limited at best. No road access exists to most of the sub-alpine areas. Consequently, ground counts appear biased toward the adult female and fawn component of the population. Use of this method in the study area also resulted in a relatively high proportion of unclassified animals. The use of a predator call, to attract and hold a deer's attention for a relatively long period of time, may increase the proportion of animals classified, and possibly the number of deer counted. However, because the call apparently imitates the bleat of a fawn it may bias counts towards the doe component of the population.

One method of obtaining a precise post-season sex and age classification would be to livetrap and examine a sample of animals on the wintering areas, as soon after the close of hunting as possible (Forbes - personal communication). Pre-season counts using this method would not be viable, due to the segregation of various age and sex compenents of the population

on the summer ranges. However, a pre-season ratio could be derived from the post-season ratio, assuming that both the harvest and crippling losses could be accurately defined. However, the logistical and financial restraints associated with such an approach preclude it from consideration in the study area.

A variety of other techniques exist for estimating deer numbers. Among these is the Lincoln Index method which was used in the late 1960's to estimate the deer population utilizing the Lower Skagit Valley (Forbes - personal communication). However, a number of problems exist with this method. These include emigration of marked animals from the study before a follow-up survey is concluded, and the possibility that marked and unmarked animals are not equally likely to be encountered in a follow-up survey (Connolly, 1981). This method is also fairly labour intensive, a factor that must be considered in light of regional priorities and limited budgets. Other methods, such as strip censuses and track counts are unlikely to be suited to the study area due to access difficulties.

In conclusion it is recommended that the model

$$X = (A)(B)(C)$$

continue to be used to estimate deer numbers in the study area. Until a viable method is found to classify deer in the study area, a subjective estimate of 40% antlered animals in the population should be assumed. At worst, subsequent field data may prove this proportion of antlered animals to be too high. In that case, the size of the deer population will have been underestimated and presumably subjected to conservative management techniques. The most likely ramification of such a scenario would be limited to lost recreation opportunity, due to restrictive harvest regulations. Such a situation is usually quickly remedied and is unlikely to have any long term detrimental impact on the deer population.

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