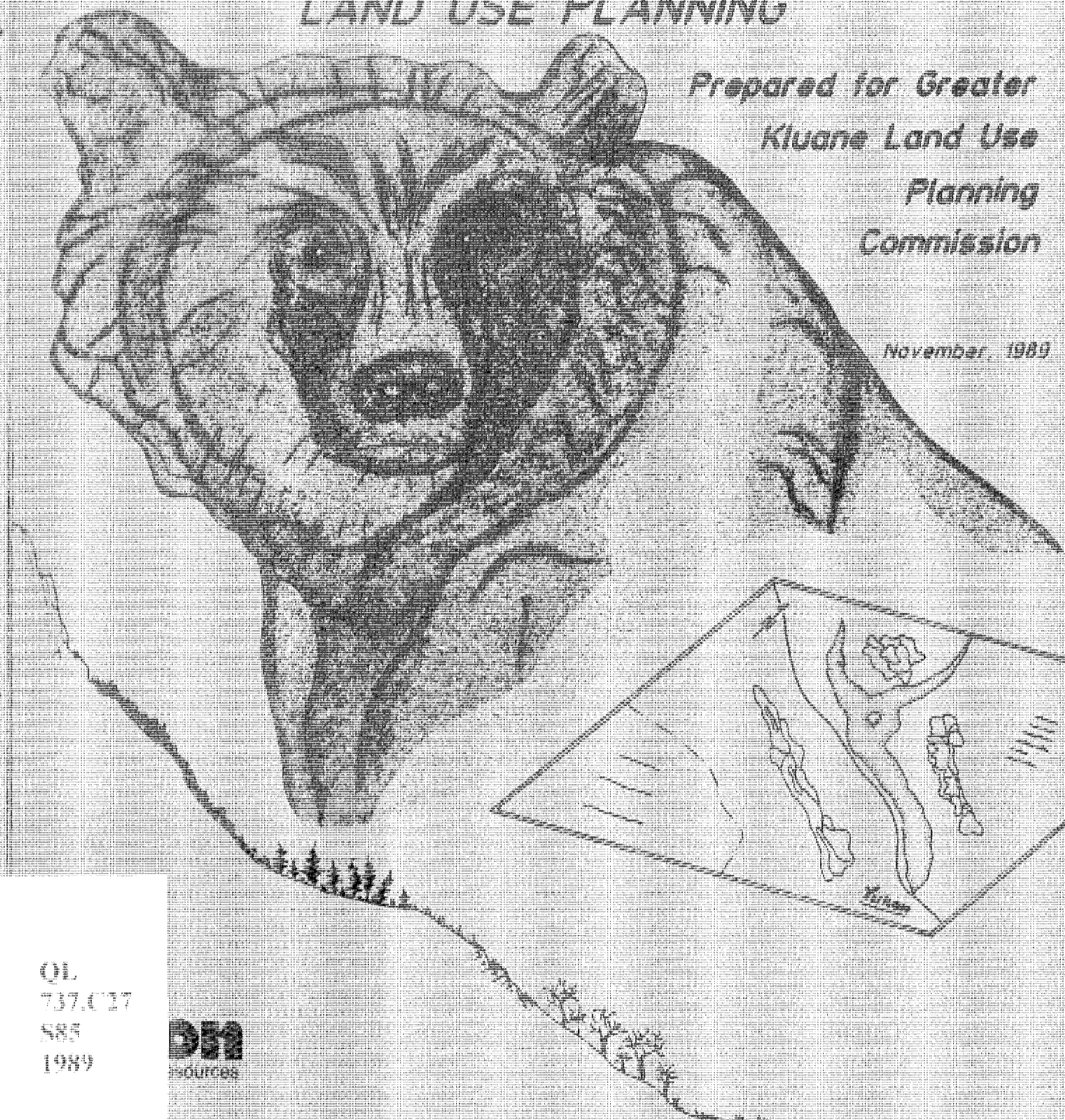


IDENTIFICATION AND MAPPING OF KEY GRIZZLY BEAR HABITAT IN THE GREATER KLUANE LAND USE PLANNING REGION AND ITS IMPLICATIONS TO LAND USE PLANNING

*Prepared for Greater
Kluane Land Use
Planning
Commission*

November, 1989



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FINAL REPORT

IDENTIFICATION AND MAPPING OF KEY GRIZZLY BEAR HABITAT
IN THE GREATER KLUANE LAND USE PLANNING REGION
AND ITS IMPLICATIONS TO LAND USE PLANNING

A report prepared for the
Greater Klauane Land Use Planning Commission

Ron Sumanik

Fish and Wildlife Branch
Department of Renewable Resources
Government of Yukon



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November 1989

The problem of management of grizzlies becomes more a matter of management of humans intruding into grizzly habitat. Without proper care, direct or potential confrontations will occur between man or his possessions and the grizzly. Until now the grizzly has always lost these confrontations.

----- A.M. Pearson

Summary

1. Yukon grizzly bears represent a significant portion of the North American population.
2. Loss of habitat and attractions to man-made food sources are the ultimate causes of grizzly bear mortality throughout North America. Various studies suggest that if bears and people are to coexist within the Greater Kluane Land Use Planning Region (GKLUPR) and elsewhere, then grizzly bear habitat must be maintained and unnatural sources of food must be inaccessible to bears.
3. This project, sponsored by the Greater Kluane Land Use Planning Commission and Yukon Department of Renewable Resources, Habitat and Research Section, defines and identifies key grizzly bear habitat within the GKLUPR.
4. First, numerous potentially key habitats were mapped. Potentially key areas were further evaluated and ten areas were identified as key to grizzly bears.
5. In addition to identification and mapping of key areas, the results presented herein support researchers who view the grizzly bear as a landscape user. Consequently, there are no areas within the GKLUPR where some grizzly bears would not be drawn to an unnatural attractant. Therefore I recommend that land use guidelines and practices be implemented throughout the planning region and the most stringent land use guidelines should be implemented in key grizzly bear habitat.

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Vickey Aschacher typed and edited this report. Frances Naylen assisted with the preparation of the habitat map. Nicole Hulstein and Thom Rodgers completed the graphics. Norman Barichello, Jean Carey, Beth Hawkings, Valerie Loewen, Barney Smith, and Jennifer Staniforth reviewed various drafts and provided useful suggestions to improve this report. Marcus Waterreus and Debbie van de Wetering documented comments and mapped potentially key bear areas identified during interviews with Kluane residents. I am grateful to those people who, through personal interviews, related their knowledge of bears and other wildlife in the Kluane region.

TABLE OF CONTENTS

	<u>Page</u>
AUTHORIZATION.....	i
QUOTATION.....	ii
SUMMARY.....	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENTS.....	v
LIST OF FIGURES.....	vi
INTRODUCTION.....	1
OBJECTIVES.....	2
LITERATURE REVIEW.....	2
METHODS.....	3
Vegetation Type Mapping within the GKLUPR.....	3
Selection of Vegetation Types Potentially	
Key for Grizzly Bears.....	4
Identification of Key Habitat for Grizzly Bears.....	5
RESULTS AND DISCUSSION.....	6
Sources of Error.....	6
Bear Habitat.....	6
CONCLUSIONS.....	10
RECOMMENDATIONS AND MANAGEMENT IMPLICATIONS.....	11
LITERATURE CITED.....	13
APPENDIX A.....	16
APPENDIX B.....	18
APPENDIX C.....	21
APPENDIX D.....	22

LIST OF FIGURES

	<u>Page</u>
Figure 1. Key Grizzly Bear Areas within the GKLUP.....	7

INTRODUCTION

The grizzly bear (Ursus arctos L.) was once distributed across North America. As man settled and developed North America, bears were extirpated from much of their range. The Yukon, combined with Alaska, British Columbia, and portions of the N.W.T., represents the final stronghold for North American grizzly bears (LeFranc et al. 1987). For many people the grizzly bear symbolizes wilderness, thus people place a high but intangible value on grizzly bears.

In addition to the innate value of grizzly bears, activities such as photographing, hunting, and viewing of grizzly bears contribute to the economies of public and private sectors in the Yukon (van de Wetering and Smith 1989). Within the Greater Kluane Land Use Planning Region (GKLUPR) grizzly bears are abundant, and in the Aurial Range they exist at the highest density known for the Yukon (Pearson 1975).

Some grizzly bears, though abundant in the GKLUPR, are being killed needlessly because they have threatened people and damaged property after becoming habituated to attractants that were produced by people. As a result of bear-people conflicts, an average of 5 grizzly bears are killed annually in the GKLUPR (van de Wetering and Smith 1989). The loss of 5 grizzly bears annually may seem inconsequential, however, many authorities have documented that animals such as grizzly bears, that have low reproductive rates, are prone to population decline. The loss of a few bears beyond those lost to hunting and natural mortality can cause the decline of a growing or stable bear population. In addition, the existence of "nuisance" bears serves as a warning that habitat loss and bear-people conflicts, processes responsible for the extirpation of bears from southern regions, are occurring in the Yukon.

Servheen (1985) stated that the survival of the grizzly bear depends upon the following: 1) grizzly bear habitat must be managed and preserved; 2) people must be educated about what

is required to coexist with bears; and 3) human-induced mortality of grizzly bears must be minimized.

In an effort to conserve bears in the GKLUPR and elsewhere, a three-pronged complementary study was designed and funded through the GKLUP Commission and the Habitat & Research Section. First a review of issues, our present state of knowledge, and data gaps regarding grizzly bears in the GKLUPR was completed (Govt. of Yukon 1989). [v]an de Wetering and Smith (1989) presented land use guidelines necessary to facilitate the coexistence of bears and people. I attempted to map key grizzly bear habitat within the GKLUPR (see objectives below). I define key habitat for grizzly bears as natural feeding areas where food is of such high quality or abundance that grizzly bears are known to concentrate seasonally in such areas. For example, each year many grizzly bears may concentrate at a specific river to feed on salmon. In contrast, potentially key areas are the precursor to key habitat areas. They are areas that I believe may be key but my evidence is not supportive enough to classify them as key to grizzlies.

OBJECTIVES

The objectives of this report are: 1) to identify and map key grizzly bear habitat within the Greater Kluane Land Use Planning Region so that land use developments might be strategically located to reduce bear-people conflicts; and 2) to evaluate the usefulness of mapping key grizzly bear habitat for land use planning purposes; and 3) to assess the management implications to land use planning by mapping key grizzly bear habitat.

LITERATURE REVIEW

Before detailing the methods used to delineate key grizzly bear habitat, a brief review of grizzly bear habitat selection, food habits and the consequences of their food and habitat requirements is useful. Grizzly bears are omnivores and opportunistic feeders. In addition, the grizzly bear has a simple digestive system (Mealey 1980), therefore foods pass through the digestive system rapidly, and only the easily digestible nutrients are extracted.

Several studies have documented a pattern where grizzly bears begin feeding on vegetable matter at low elevations in spring. As summer progresses bears move to subalpine and alpine areas to feed. Just prior to denning in the early winter bears return to low elevations to feed (Martinka 1972, Mundy and Flook 1973, Servheen 1981). In studies where this pattern did not occur, researchers have noted a tendency for bears to feed on south- or southwest-facing slopes during spring, and as seasons progress, bears move to more northerly aspects to feed. Hamer and Herrero (1987) suggest that by seasonally ascending and descending mountains or shifting to different slope exposures, bears increase their probability of locating plants high in protein and low in fiber (i.e. easily digestible plants that suit their digestive physiology). Thus grizzly bears must first locate a source of food, then to optimize caloric benefits, they must find the food at the optimum stage of development. To locate these unique food patches bears frequently travel great distances (Knight et al. 1988). Only in areas that contain abundant and diverse bear foods in various phenological states would we expect bears to have reduced home ranges, and subsequently, exist at higher densities (i.e. in key habitats). The remainder of Yukon grizzlies would be expected to search for smaller and more widely distributed patches of bear foods.

METHODS

Vegetation Type Mapping within the GKLUPR

Over the past 15 years, seven different vegetation classification and mapping projects were completed, covering an estimated 50% of the suitable bear habitat within the GKLUPR. Only four of the vegetation maps were useful for delineating bear habitat in this analysis (APPENDIX A). Hoefs et al. (1975) mapped vegetation on Sheep Mountain, however, the scale (1:12 500) of the Sheep Mountain map was too detailed and most of the vegetation units were too small for the units to show on the 1:250 000 scale map produced in this project. In addition, Douglas (1980) described detailed vegetation communities within Kluane National Park,

however the map accompanying the descriptions was not of sufficient detail to accurately map important grizzly bear habitat. I was not aware of a third map and description (Kennedy 1986), therefore it was not obtained prior to completion of this report.

Objectives differed among the four vegetation studies selected for review, however only minor variations in methodology were used to map and describe vegetation types. Their common methods consisted of delineating different vegetation types on aerial photographs, ground sampling the different types to classify them, and then returning to the aerial photos to make boundary corrections to the vegetation types. Finally, a report describing the different vegetation types and a map were produced.

Selection of Vegetation Types Potentially Key for Grizzly Bears

Vegetation types described for the East Kluane Planning Project (Oswald et al. 1981), and Resource Inventory-Southern Lakes (Davies et al. 1983) were reviewed and rated for their importance to grizzly bears by four wildlife biologists. The four individuals, Dr. Manfred Hoefs (Supervisor, Habitat and Research), Dr. Art Pearson (Environmental Consultant), Barney Smith (Bear Management Biologist), and Ron Sumanik (Upland Specialist), are extremely familiar with the Kluane region, having conducted bear research, habitat studies, or other wildlife studies within the GKLUPR. Due to time constraints, vegetation descriptions from the remaining two studies (Bastedo and Theberge 1986, Theberge et al. 1986), were reviewed and rated by Smith and Sumanik and only types chosen by both reviewers were rated as important for grizzly bears.

Each biologist used his own criteria for choosing what he believed to be potential key bear habitat. Most choices were vegetation types that contained plants that are important foods for the northern interior grizzly bear (APPENDIX B). Hamer and Herrero (1986) suggested many of the habitats selected by bears are selected primarily for feeding purposes, therefore, in this project, the consistent selection of vegetation types

containing bear foods is a valid criteria for identifying potentially key bear habitat. For Southern Lakes and East Kluane projects, each vegetation type that was rated as important to bears was written down under the name of the biologist that had given that type a high rating. If three or four biologists assigned the same type a high rating, then that type was considered to be potentially key to grizzlies and consequently those vegetation types were mapped. Eleven vegetation descriptions that were chosen by only two biologists were reviewed again by Sumanik and Smith and seven of these types were elevated to the potentially key habitat category. For the East Kluane planning project, 22 (20%) of the 111 vegetation types were rated as potentially key to grizzly bears, and for the Southern Lakes project, 10 (20%) of the 50 vegetation types were rated as potentially key to grizzlies. These areas were considered potentially key during the non-denning period.

APPENDIX C lists the vegetation types chosen as potentially key types from each of the four source documents. The descriptions associated with each type can be found in the source documents. All the vegetation units identified as potentially key for grizzly bears were mapped. The maps of potentially key habitats is not presented in this report but they can be obtained from the Habitat and Research Section.

Potentially key habitats for grizzly bears were also identified by 1) reviewing Pearson (1975); and 2) interviewing Yukon people familiar with grizzly bears and their activities within the GKLUPR.

Identification of Key Habitat for Grizzly Bears

Key habitats for grizzly bears were identified by combining several adjacent or overlapping, potentially key areas. Although some subjectivity was involved in defining boundaries of key areas the central methodology consisted of encompassing adjacent and overlapping potentially key areas that had been identified by at least two of the three methods listed above.

RESULTS and DISCUSSION

Sources of Error

There was no indication that ground checking was a component of the vegetation mapping studies that were reviewed, therefore no accuracy value can be assigned to the vegetation maps. However, upon completing a small vegetation mapping study, Kennedy (1986) expressed doubts about: the level of detail, identification of subalpine types containing sparse tree cover, and identification of types containing willow in a portion of the East Kluane mapping region (Oswald et al. 1981).

For the reasons expressed above, vegetation units that were delineated and classified as certain vegetation types may be incorrect. The units could be incorrectly identified, or the boundary delineating the unit may be mapped inaccurately. In the context of this work, it means that areas classified as potentially key may not exist at the location shown. In addition, four biologists read descriptions of each vegetation type, formulated a mental picture of the type, and subjectively decided whether it was important to bears. Their assessment and interpretation of these descriptions and bear requirements may be inconsistent but not necessarily incorrect. Therefore vegetation types that are potentially key to grizzly bears may not have been identified as potentially key, conversely types rated as potentially key to bears may not be potentially key. Due to the possible sources of error I was extremely conservative when I considered elevating a potentially key area to key habitat status.

Given the time allotted, this method represents our best attempt at identifying key grizzly bear habitat. The results must be taken as correct until a more thorough method is used to identify and delineate grizzly bear habitat (e.g. Craighead et al. 1982).

Bear Habitat

More than 100 widely distributed potentially key areas were identified during this study. Ten key habitats were selected from those potentially key areas (Figure 1).

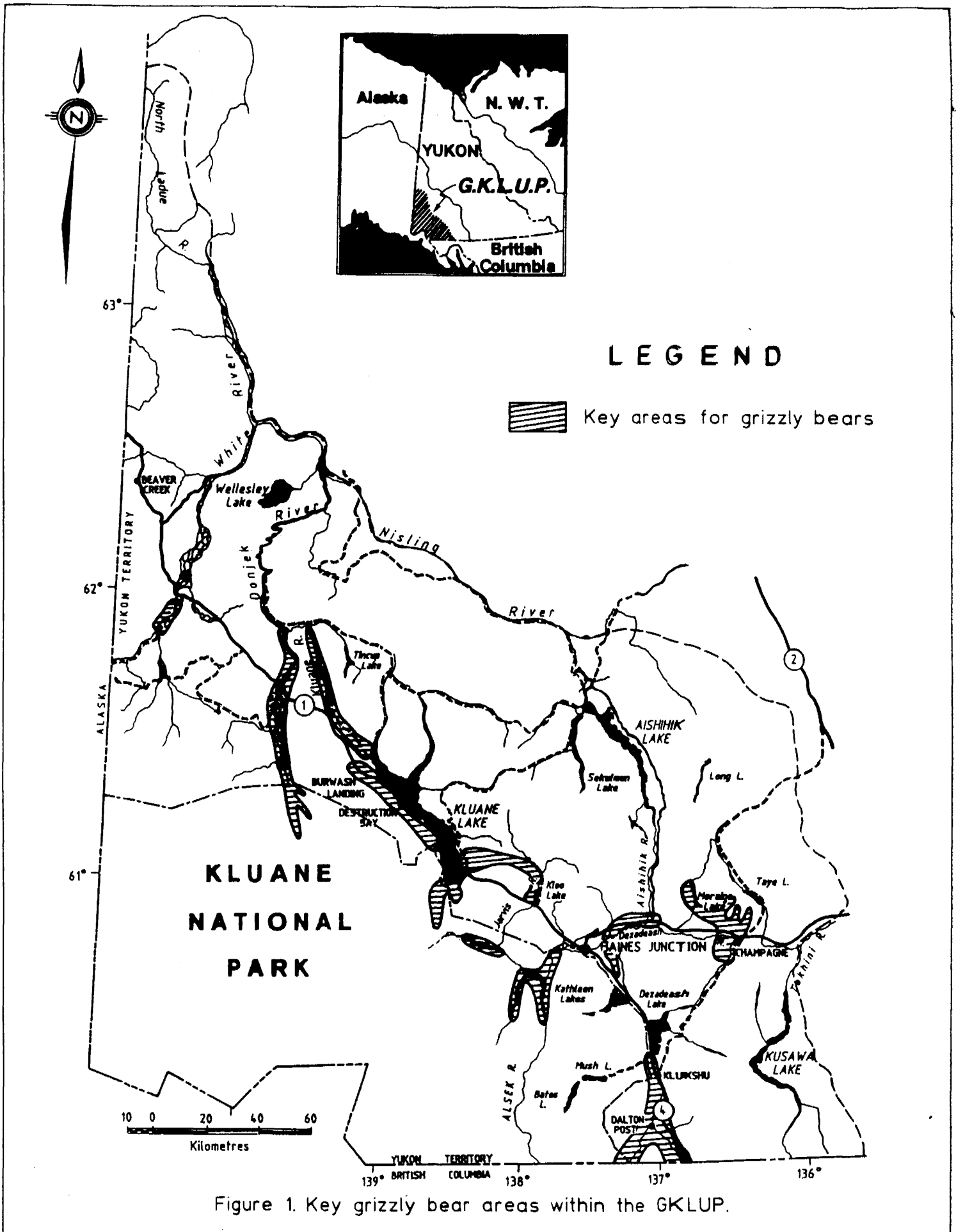


Figure 1. Key grizzly bear areas within the GKLUP.

Interviewees consistently identified seral floodplains as potentially key to Kluane bears. Interviewees may be biased in their selection of floodplains because bears would be more visible than in many other habitat types. However, in support of their observations Pearson (1975) also identified floodplains as key feeding areas and movement corridors. In addition, some of the vegetation types rated as potentially key during the review of vegetation descriptions were located along floodplains.

The key areas identified should be viewed as areas where any land use that occurs on or adjacent to them will very likely result in frequent conflicts between bears and people. These key areas are not the only areas that bears use; rather, the key areas identified are likely to be used by bears consistently each year unless they are dramatically changed due to fire or other processes. In relatively pristine wilderness areas, bears occupy home ranges that may be adjacent or overlap among and between sexes (APPENDIX D). In addition, grizzly bears make use of vast areas of less important habitat. If random points representing development sites are chosen on the maps, there is a high probability that the point will fall within 5 km of at least one potentially key grizzly habitat; a distance that, on average, grizzly bears travel daily (Y.T.G. unpubl. data). Therefore, any development located within the GKLUPR could be reached by at least one grizzly within one day.

Data presented in APPENDIX D also indicates that any randomly selected point representing a development in the southwest Yukon wilderness will fall, on average, within the home range of a minimum of two adult grizzly bears. Yellowstone National Park grizzly bears have home ranges of similar size (Knight et al. 1988) to southwest Yukon grizzlies (Larsen and Markel 1989). In Yellowstone National Park, home ranges of that size exposed any given bear to at least one unnatural attractant. In the Yukon, the locations of unnatural attractants are also sources of significant grizzly bear mortality (Y.T.G unpubl. data). In the GKLUPR unnatural attractants exist at lower densities than in

Yellowstone National Park yet many bears are attracted to these unnatural areas (Y.T.G. unpubl. data).

If an unnatural attractant is extremely desirable to bears, and if food is successfully obtained there, then bears modify their home range and that source becomes an extremely important part of its home range (Stokes 1970, Meagher and Phillips 1983). It is also common for many bears to overlap at a food-rich source. In a natural setting a food-rich source might be a stream full of salmon. An unnatural source is the Haines Junction dump where 15 different grizzlies were observed feeding this past autumn (D. Drummond pers. comm. 1989).

Data presented by Knight et al. (1988) indicated that adult female mortality rates were inversely related to annual habitat productivity, particularly during autumn. Female bears did not die from starvation, rather they sought alternate foods that brought them into conflict with people and ultimately the bears were killed. The authors concluded the best management strategy was to eliminate unnatural food sources that attract bears. Recently, Knight et al. (1988) stated:

Grizzly bears, because of their omnivorous food habits, natural aggressiveness, and ability to move long distances, will likely find any permanent human habitation within their home range and obtain food there if possible,..., in most settlements they (bears) usually are removed by appropriate authorities. These sites become "population sinks", sites that bring bears into contact with humans often resulting in removal of bears from the population.

Some bear biologists have recognized that protection of grizzly bears and reduction of bear-people conflicts cannot be completed simply by restricting unnatural food sources and human use of key grizzly bear habitat. They recognize that most feeding areas are widely distributed and not of significance to yield a concentration of bears. Interior grizzly bears exist at low densities, are often solitary, have large home ranges, and make long movements in search of limited food patches. Therefore grizzly bears should be recognized as creatures of "landscapes"

rather than of specific habitat types (Harris and Kangas 1988, Schoen 1989). Thus the "Achilles' heel" of the grizzly bear is they are landscape users.

If bears are viewed as creatures of landscapes, then any area that is composed of large tracts of wilderness (i.e. the Greater Kluane Region) can be expected to harbour bears and interactions with people can be expected. Unfortunately, recognition of the ten key habitats within the GKLUPR will not eliminate bear-people conflicts. A greater frequency of conflicts is likely to occur in key grizzly habitat but we must accept the idea that grizzly bears are landscape users and recognize that mapping key bear habitat, whatever the scale or quality, is not a complete answer. Accepting this idea, then people must be educated to follow certain guidelines ([v]an de Wetering and Smith 1989) that promote coexistence of bears and people in all wilderness areas.

Translocation of problem bears is not a solution either. In Yellowstone National Park 27 of 52 problem bears returned to the area where they were originally a problem. Ultimately 29 of those "problem bears" were destroyed. Translocation is costly, ineffective and in some cases, merely moves the problem from one site to another. Knight et al. (1988) concluded:

While translocation of bears from population sinks may remove them temporarily from situations of high death risk, the best management strategy remains elimination of those food sources that attract bears to sinks.

CONCLUSIONS

Bear management, or wildlife management for that matter, is often achieved by managing people. A management solution to the Yukon bear problem requires that people accept the behaviour and natural distribution of Yukon bears and begin to work positively toward coexistence rather than to remove bears each time a conflict arises. Guidelines, within which bears can coexist in the

presence of people, have been developed and implemented successfully in other areas. Such guidelines have never been a compulsory requirement of Yukon land users or developers (van de Wetering and Smith 1989).

Mapping key grizzly bear habitat is important but should be viewed as information complementary to land use guidelines for the purpose of managing bears and people in all wilderness areas. Mapping key bear habitat may be sensible for evaluating options for siting land uses but in the long term, mapping may be less worthwhile than developing legislation and guidelines to manage bear attractants and land use activities. If land use guidelines and land use siting are incorporated into the plans of all Yukon operations and developments, then people, human property, and bears will coexist in most instances.

For example, despite significant human encroachment, brown bears continue to survive in Europe. Bears survive because they have adapted to encroachment and local residents are tolerant of brown bears (Elgmork 1978). If bears and people can coexist in Europe, where food sources and human densities are much greater than the bear-people conflicts that exist in the Yukon should be easily resolved.

If the status quo continues, and as long as people reside and are active in the GKLUPR, evidence indicates grizzly bear populations will suffer and ultimately go the way of their southern counterparts.

RECOMMENDATIONS AND MANAGEMENT IMPLICATIONS

- 1) In this study, the four biologists that reviewed the vegetation descriptions were allowed to use their own criteria to determine important habitat for grizzly bears. In retrospect, this was a subjective "opinion poll" methodology. A more objective method would be to determine the criteria

that denotes important grizzly bear habitat first, and then apply those standard criteria to determine potentially key and key grizzly bear habitat.

- 2) The habitat identified in this project should be considered key for the entire non-denning period (April 1-November 1). However there may be habitats that are most important during certain seasons of the non-denning period. In the future, a more thorough method should consider defining the time of use of key areas so that operating periods for some land use activities are less restricted.
- 3) Grizzly bears must be viewed as users of landscapes. The map of key grizzly bear habitat and supportive literature referenced in this report indicate that most land use activities and developments cannot be strategically located to avoid bears, although some locations (i.e. non-key habitat) are more advisable than others.
- 4) The identification and mapping of key habitat supports [v]an de Wetering and Smith (1989) and suggests that stringent land use guidelines to enhance the coexistence of bears and people must be incorporated into all existing and future land uses. I recommend human activities in key grizzly bear habitat have greater restrictions than in non-key areas.
- 5) If any areas are considered for protection, I recommend that the key habitats identified in this report be protected to benefit bears.

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APPENDIX A: Coverage of interview comments and the four studies of vegetation classification and description used to identify key grizzly bear habitat within the GKLUPR (Oswald et al. 1981, Davies et al. 1983, Bastedo and Theberge 1986, Theberge et al. 1986).



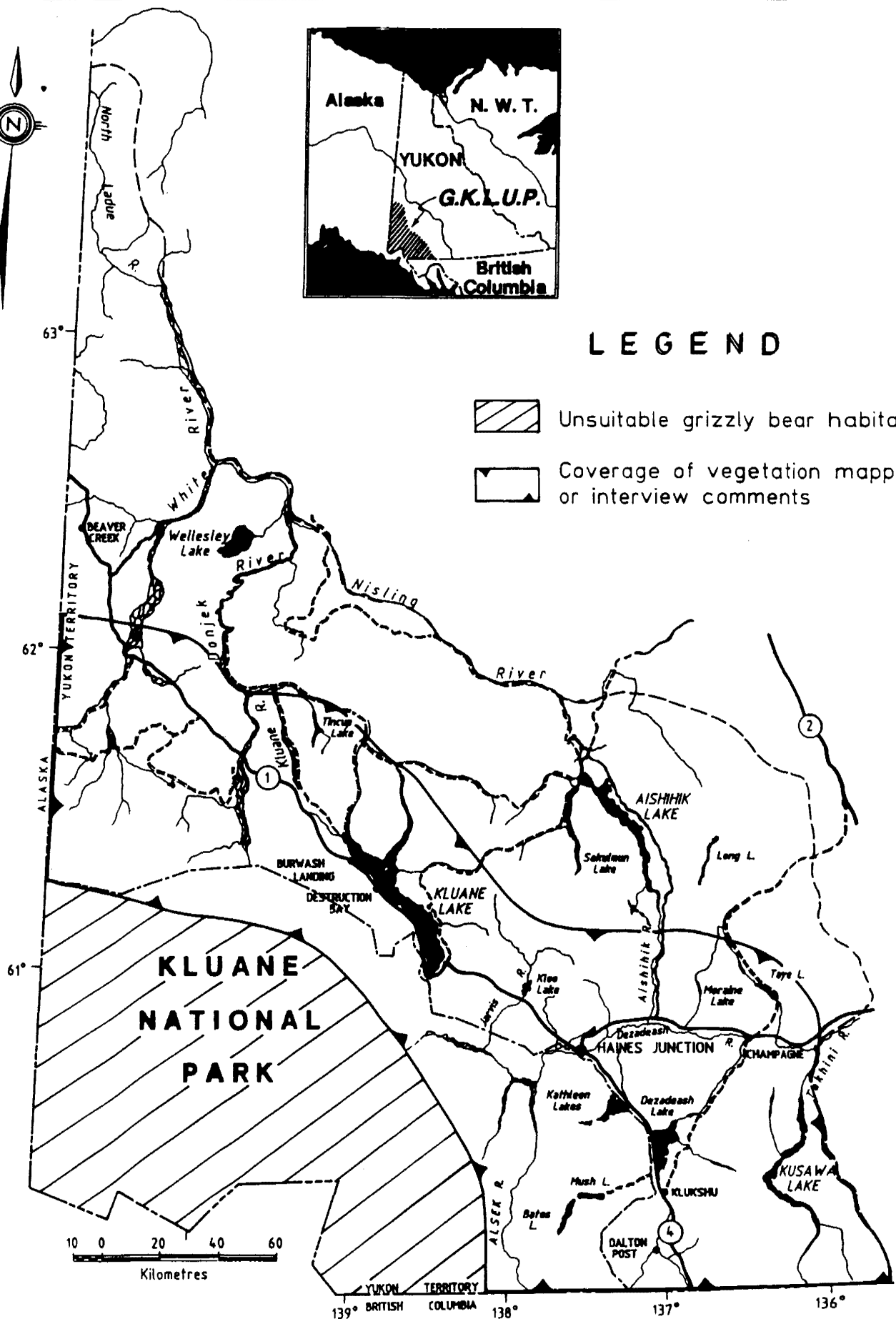
LEGEND



Unsuitable grizzly bear habitat



Coverage of vegetation mapping or interview comments



APPENDIX B: Foods eaten by the northern interior grizzly bear.

ATHYRIACEAE

Athyrium filix-femina

ARACEAE

Lysichiton americanum

CAPRIFOLIACEAE

Lonicera involucrata
Symphoricarpus albus
Viburnum edule

COMPOSITAE

Achillea millefolium
Agoseris aurantiaca
Agoseris glauca
Senecio triangularis
Taraxacum officinale

CORNACEAE

Cornus canadensis
Cornus stolonifera

CUPRESSACEAE

Juniperus horizontalis

CYPERACEAE

Carex albo-nigra
Carex filifolia
Carex scirpoides
Carex sitchensis
Scirpus microcarpus

ELAEAGNACEAE

Shepherdia canadensis

EQUISETACEAE

Equisetum arvense
Equisetum hiemale

ERICACEAE

Arctostaphylos uva-ursi
Vaccinium caespitosum
Vaccinium uliginosum
Vaccinium vitis-idaea

GRAMINEAE

Agropyron repens
Agropyron spicatum
Bromus inermis
Calamagrostis canadensis
Calamagrostis purpurascens
Deschampsia caespitosa
Festuca baffinensis
Festuca scabrella
Phleum pratense
Poa alpina
Poa pratensis
Trisetum spicatum

GROSSULARIACEAE

Ribes hudsonianum
Ribes lacustre

LEGUMINOSAE

Astragalus alpinus
Astragalus Robbinsii
Hedysarum alpinum
Lupinus nootkatensis
Oxytropis campestris
Trifolium repens

LILIACEAE

Allium schoenoprasum
Streptopus amplexifolius
Streptopus roseus
Veratrum viride

POLYGONACEAE

Oxyria digyna
Polygonum viviparum

PORTULACACEAE

Claytonia megarhiza

RANUNCULACEAE

Actaea rubra

ROSACEAE

Amelanchier alnifolia
Fragaria virginiana
Rosa acicularis
Rubus idaeus
Rubus parviflorus
Rubus spectabilis
Sorbus scopulina

UMBELLIFERAE

Angelica genuflexa
Cicuta Douglasii
Heracleum lanatum
Osmorhiza chilensis
Osmorhiza purpurea

VALERIANACEAE

Valeriana sitchensis

APPENDIX C: Community codes for vegetation types rated as important to grizzly bears in the GKLUP Region.

Aishihik Corridor (Bastedo and Theberge 1986. 1:250 000 scale vegetation map.)

F1.2c
F2.2
Sh2/3.1
Wdlc
Wdld

North Kluane (Theberge et al. 1986. 1:250 000 scale vegetation map.)

Ft.12a
Ft.22
Sh.21/31
Wt.2
SN.12

East Kluane (Oswald et al. 1981. 1:100 000 scale vegetation map.)

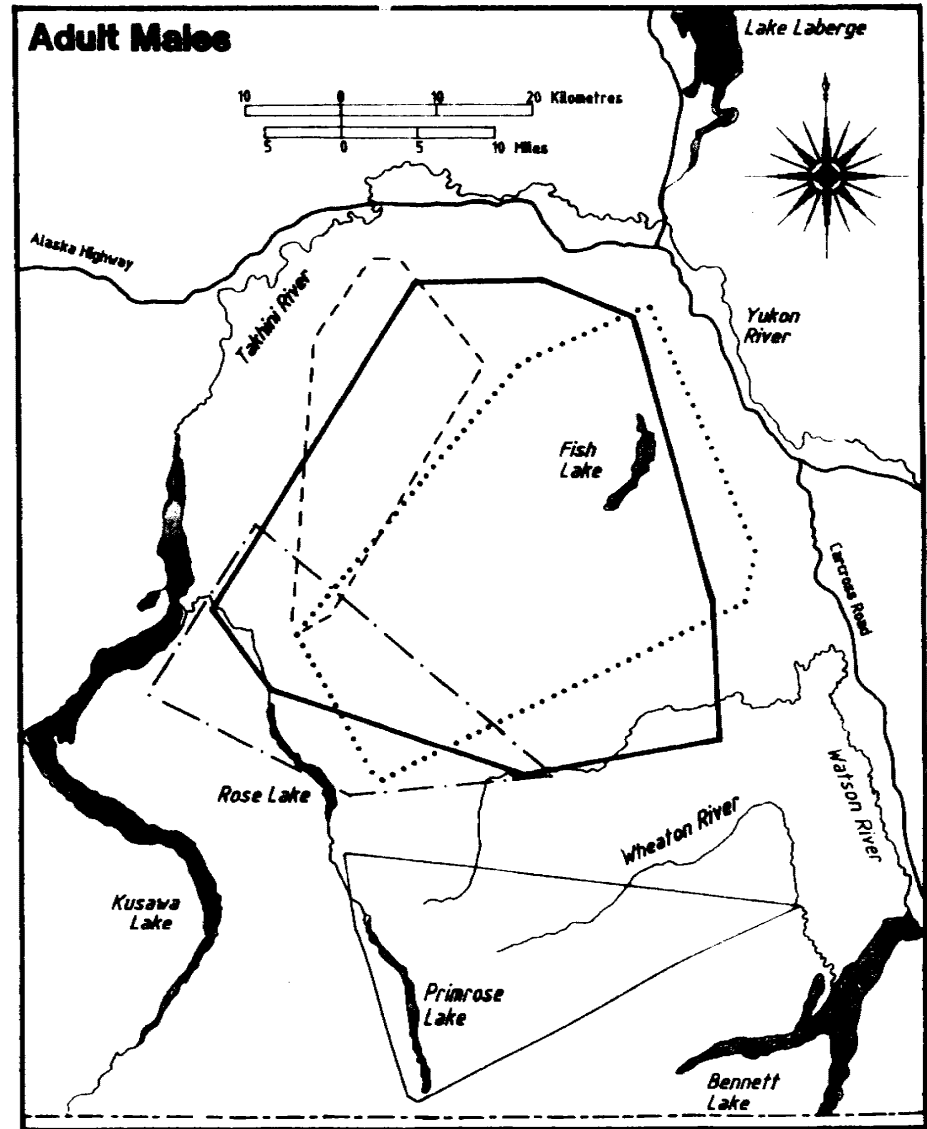
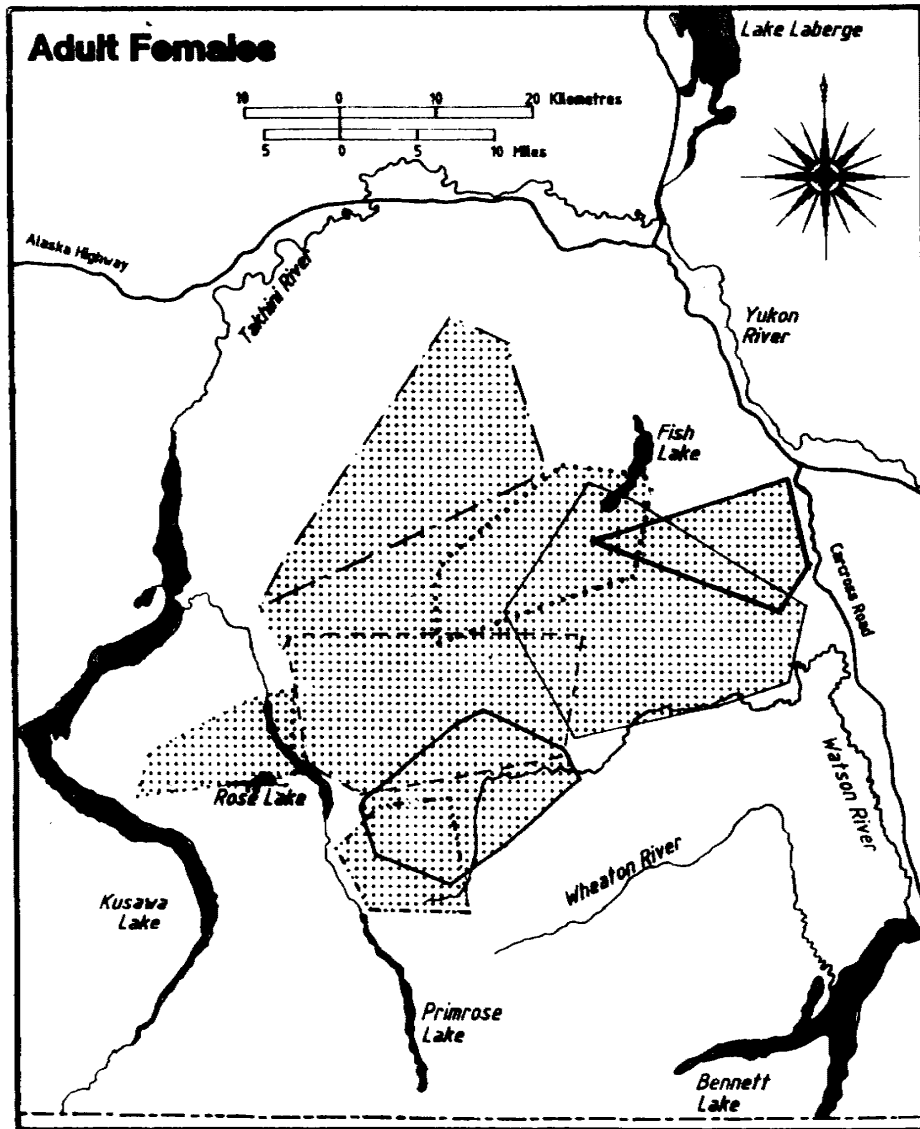
Sb-Lg-Vu/bm	WS/W-Sc/Ki
Sb-RI/S	WS/W-Vu/bm
TA/Ki	WS-BP/Al/fm
TA/Lg-En	WS-BP/AL/G
TA/Sc-Ve	WS-BP/Sb-Lg
W-Sb/En	WS-BP/Sc
W-Sb/G	WS-BP/Sc/fm
W-Sb-Lg/bm	WS-BP/W/Ki
WS/Al/fm	WS-TA/Sc
WS/Ki	WS-TA/Sc/fm
WS/Lg-Vu	WS-TA/W/Ki

Southern Lakes (Davies et al. 1983. 1:100 000 scale vegetation map.)

W-Bt/D
W-Bt
Sw/Sc
Pt/Sc-Ki
W/Eq
W-D/S-G
W-Bt/G
Sw/Ki
Pt/Ki
Pt/Ve

APPENDIX D: Homorange overlap among and between female and male grizzly bears. Data taken from Larsen, D.G. and R.L. Markel. 1989. A preliminary estimate of grizzly bear abundance in the southwest Yukon. Yukon Fish and Wildlife Branch Final Report. 52pp.

Minimum Home Ranges of Adult Female and Male Grizzly Bears in the Rose Lake Study Area, 1985 - 1986.



12

13