Summary of

Habitat Assessments, Suitability Mapping and Habitat Monitoring for Grizzly Bear in the Nangeese River Watershed, Kispiox Forest District

Prepared for:

Small Business Forest Enterprise Program
Kispiox Forest District

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INTRODUCTION

This project was undertaken to provide the Small Business Enterprise Forest Program (SBEFP) in the Kispiox Forest District with information regarding grizzly bear habitat use in the Nangeese River Watershed area, and specifically to:

- ***Assess and map the suitability of the habitats in and around the Nangeese River Watershed for use by grizzly bear.***
- ***Provide management recommendations based on the habitat suitability mapping, field reviews and local knowledge of the Nangeese River Watershed area to minimize impacts to important grizzly bear habitats.***

Based on the information gathered during the development of the ecosystem mapping and the field assessments, a follow-up project was undertaken to:

- ***Develop a cost effective monitoring method for grizzly bear habitat use that would allow resource managers to detect changes in habitat use due to forest harvesting activities.***

To meet the above project objectives, the following work was completed from 1999 to 2001, involving both field and office assessments:

- Development of an ecosystem map based on air-photo interpretation and digital mapping of ecosystems.
- Development of a habitat suitability model for grizzly bear.
- Completion of field assessments of the ecosystems and grizzly bear habitats within the Nangeese River Watershed to help develop the habitat suitability maps and review proposed harvest areas.
- Develop short and long-term management recommendations to minimize impacts to important grizzly bear habitats.
- Develop a monitoring method based on DNA hair sampling in important bear habitats to detect changes in habitat use patterns.

STUDY AREA

The study area for this project includes areas along the Nangeese River, ranging from the habitats along the river itself up to the alpine tundra habitats of the upper ridges within the watershed. The lower elevation area of the Nangeese River watershed is located in the Interior Cedar Hemlock (ICH) biogeoclimatic zone, which are transitional between the moist and rich sites of the Coastal Western hemlock (CWH) biogeoclimatic zone and the somewhat drier and colder Sub-Boreal Spruce (SBS) biogeoclimatic zone. At this broad scale, the location in the coast-interior transition ICH biogeoclimatic zone results in a combination of both coastal and interior flora. The climate is warm and moist in summer, cool and wet in fall and cold in winter. Snowfall can be heavy resulting in a deep and long-lasting snowpack.

The low to mid-elevation forests of the study area are well developed and consist mainly of western hemlock and amabilis fir with limited amounts of subalpine fir. The shrub layer is well developed and is mainly amabilis fir regeneration, huckleberries and false azalea, while the herb layer is characterized by five-leaved bramble, bunchberry and twisted stalk. Moist, rich sites have species such as devil's club, skunk cabbage and ferns. Along the Nangeese and Sweetin rivers are Cottonwood floodplain and brush habitats, which are important for bears.

At higher elevations within the watershed is the Englemann Spruce-Subalpine Fir zone (ESSF), which has a moist and short growing season and long snowy winter. Forests in the upper elevations consist mainly of relatively open stands of subalpine fir with minor amounts of mountain hemlock. Extensive wetland complexes in the western portion of the study area provide important grizzly bear habitats as the sedge meadows become snow free in the late spring and early summer. The shrub layer in the forest is well developed and is dominated by huckleberry and false azalea, but the herb layer is relatively sparse. Above the forests is a subalpine parkland which is made up of scrubby clumps of subalpine fir

interspersed with heath, meadow and grassland due to a harsh climate and persistent snowpack. At the top of the mountains, the alpine tundra is treeless and consists of sparsely vegetated rock outcrops, talus, and cliffs with areas of heath meadows and dry lichen communities on the more gentle slopes.

The Nangeese River contains important fish stocks is considered to be the major salmon producing tributary to the Kispiox River. Both spawning are rearing habitats are found in the river for fish species such as cuttroat, rainbow and Steelhead trout, Dolly Varden, and Chinook and Coho salmon. .

METHODS

The ecosystem mapping was initially developed based on air-photo interpretation, which created ecosystem units based on vegetation, landform, and drainage pattern according to a standardized methodology. Field assessments were completed in 1999 and 2000 to help in the air-photo interpretation and modify the ecosystem unit boundaries. Along with helping in the ecosystem mapping, the 1999/2000 field work was done to identify important seasonal grizzly bear habitats and travel corridors, assess ecosystems for their use by grizzly bears to help develop the habitat suitability model, and to assess grizzly bear habitat and habitat use within proposed harvest blocks in the study area. The field assessments were a combination of line transects and vegetation plots, where information was collected on the habitat types, vegetation and bear habitat use. In 2001, additional fieldwork consisting of vegetation and habitat use plots was completed to check the ecosystem and habitat mapping.

As well, in 2001, fieldwork was conducted to determine locations for hair sampling sites and place stations to test the DNA hair-trapping methods. The hair sampling stations consisted of a series of baited areas, surrounded by barbed wire to snag hair from bears for identification. A total of 10 sample stations were located adjacent or in habitats that showed use by grizzly bears. The sample stations were monitored twice during four weeks between mid-September and mid-October, by collecting any snagged hair and re-baiting the station. Hair samples were then visually sorted and identified and any possible grizzly bear hair samples were sent to a laboratory for DNA analysis.

Between field seasons, the ecosystem mapping was completed by digitally transferring the air-photo polygon lines to create a digital map and assigning the ecosystem units to the polygons. Based on the ecosystem information, existing reports on grizzly bear habitat use and the field assessments, a grizzly bear habitat suitability model was created. This suitability model assigned ratings to ecosystems based on assumptions of grizzly bear habitat use. Using the suitability model and the ecosystem map, suitability maps were be created that outlines areas that are important for grizzly bear use. For this project, habitats were rated for feeding during spring, summer and fall and hibernation during the winter. Analysis of the habitat suitability mapping was also undertaken to review the locations of potential forest harvesting on important bear habitats and to analyze the changes in the amount of important habitats during the proposed harvesting plan period.

RESULTS AND DISCUSSION

During field assessments in 1999, over 21,500 m of transect were completed, while in 2000, approximately 41,200 m of transect were completed (Figure 1). Transects were completed in a wide variety of habitat types throughout the study area, concentrating in the lower elevation areas near the Nangeese River. Transects were specifically designed to encompass areas of known or suspected high use habitats, as well as within proposed road and harvest block locations on the west side of the Nangeese River. Bear sign found during the transects included scat, feeding sites, beds, tracks and trails and hair. Sign was found to be concentrated in the lower elevations in floodplain areas, skunk-cabbage areas, mesic forest types and mid elevation wet herb meadows. Scat were the most common sign found (63% of sign), followed by tracks (9% of sign).

A total of 32 vegetation plots were conducted in 1999 and 2000 to help in the development of the ecosystem mapping, while an additional 51 plots were completed in 2001 for use in verifying the mapping (Figure 1). The vegetation plots were conducted in a variety of ecosystem types in both upper and lower elevation forests and wetland complexes.

Based on the ecosystem mapping, the habitat suitability model and supported by the information gained from the plot and transect information, high value grizzly bear habitat was identified in the study area (Figure 2). This information provided the basis for management recommendations to the Ministry of Forests that could be used for current and future harvest planning and management. Most of the high

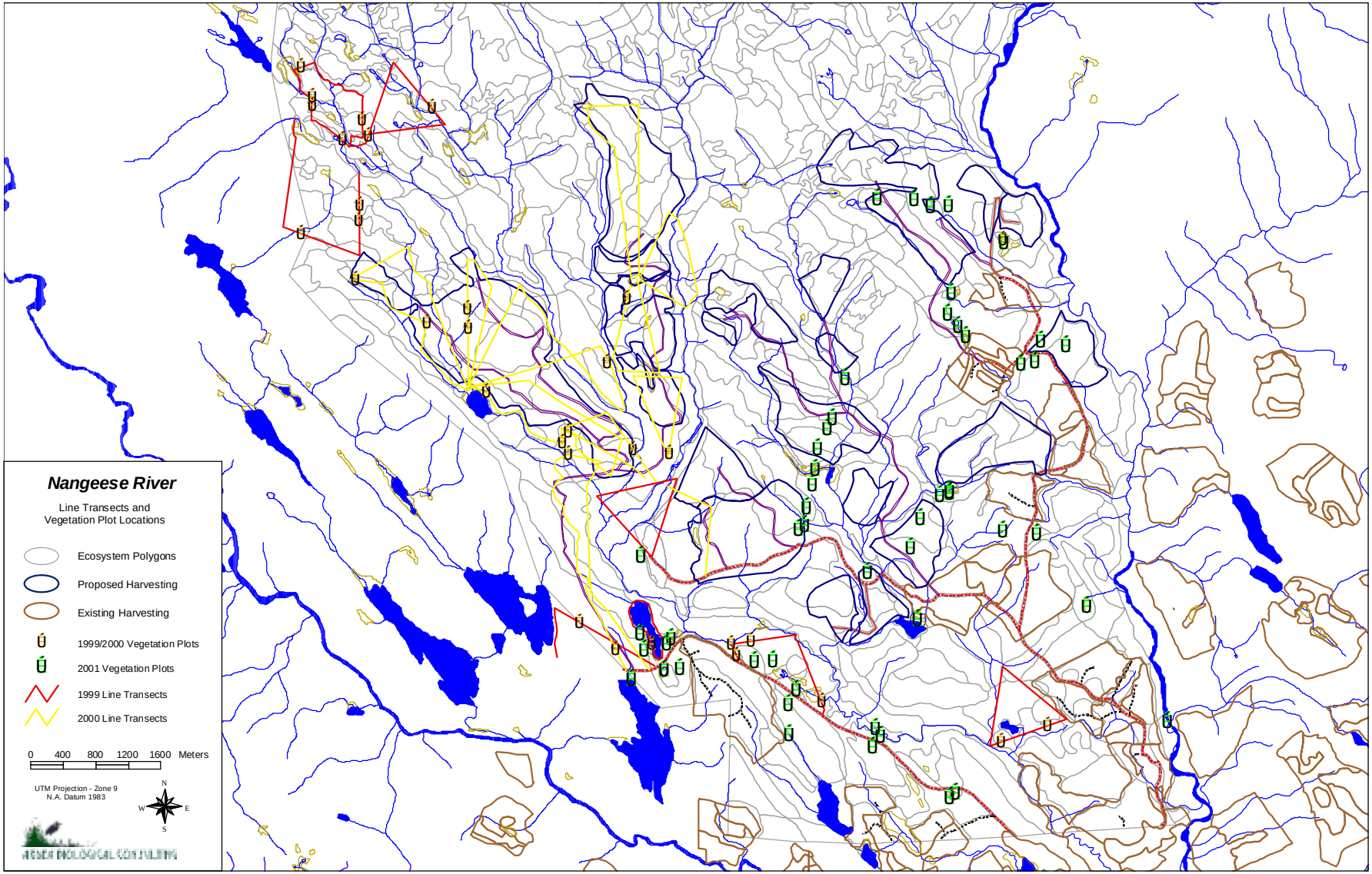

Figure 1. Location of line transects and vegetation sample plots - Nangeese River study area.

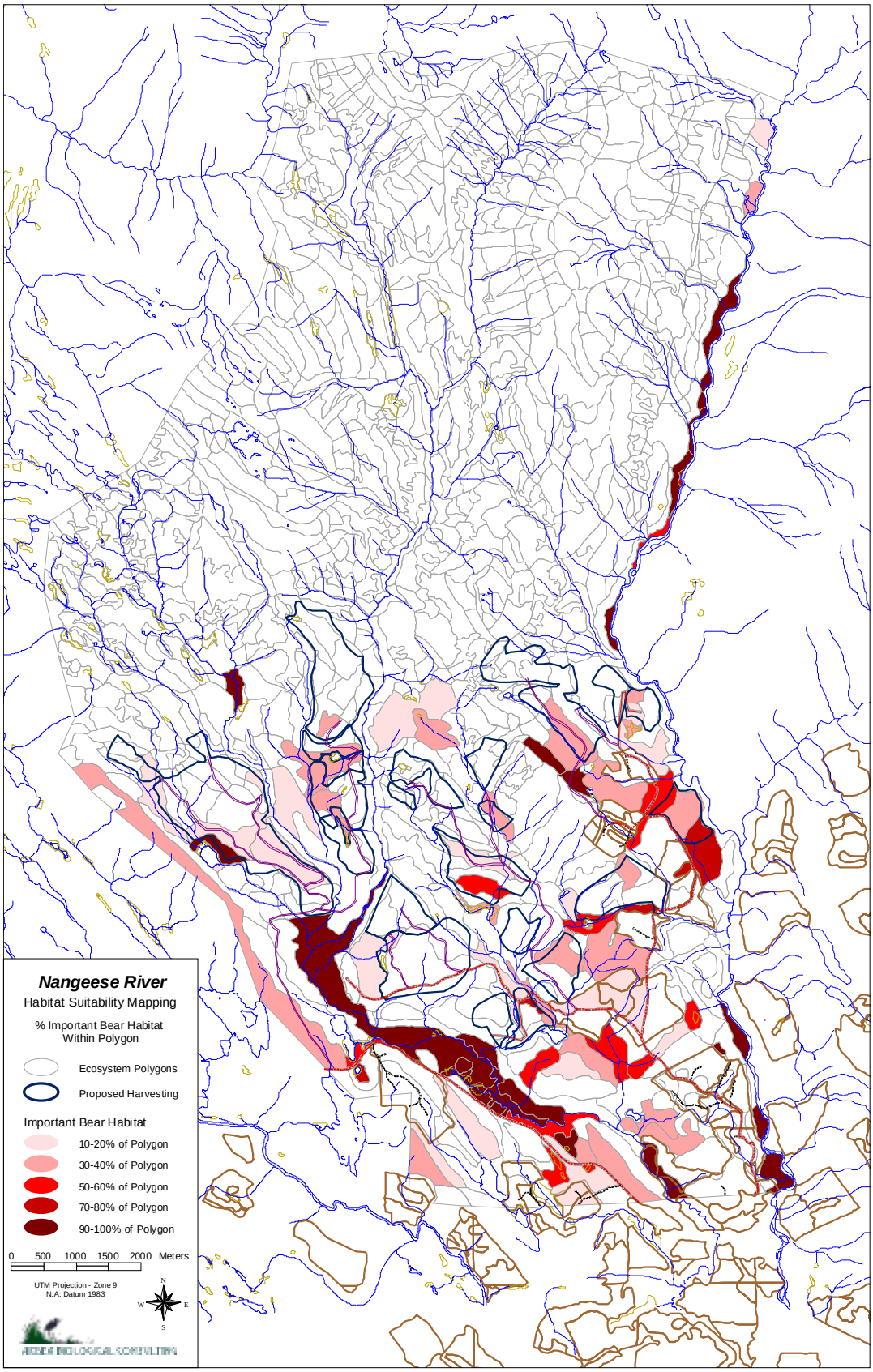

Figure 2. Locations of high value grizzly bear habitat polygons - Nangeese River study area.

value habitats were found in the lower elevation areas adjacent to the Nangeese and Sweetin Rivers. These habitats were found to contain large areas of Cottonwood floodplain types with important bear feeding plants such as salmonberry, devil's club and skunk cabbage abundant. Upland sites such as wet herb meadows and skunk cabbage seepage sites were scattered throughout the study area and contributed significantly to the feeding opportunities for grizzly and black bears.

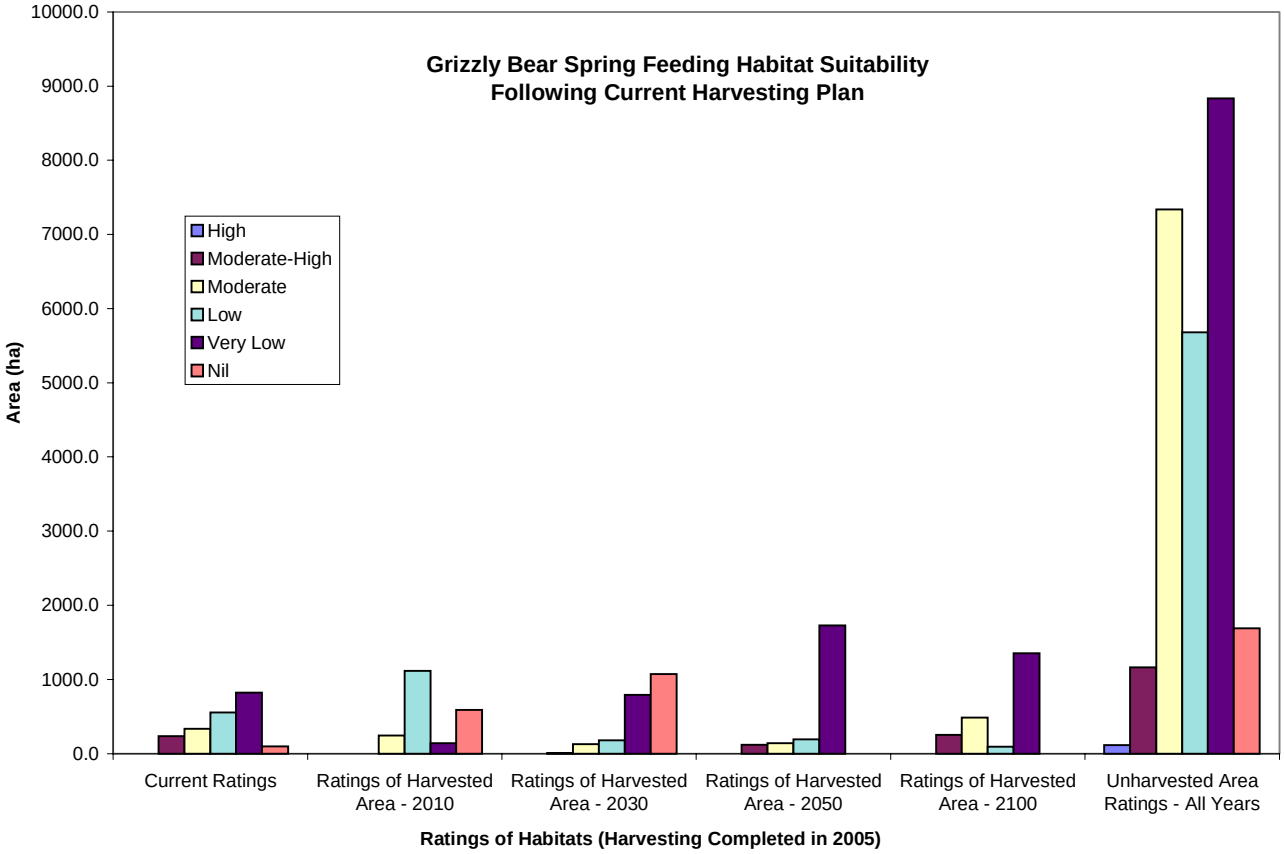

Figure 3. Projected effects on grizzly bear spring habitat from forest harvesting – Nangeese River study area.

Using the habitat suitability mapping and the proposed harvesting plan, an analysis was conducted to determine the long-term habitat effects on grizzly bear habitat due to changes in available feeding habitats. A sample of the results of the analysis is shown in Figure 3 for grizzly bear spring feeding habitats. The analysis shows that currently moderate to moderate-high value sites (approx. 800 ha) will have lower habitat value as they are harvested and regenerate. This is due to the herb and shrub layers becoming less available as the forest canopy closes between 20 and 50 years from the point of harvesting. At 2050 there will be a total of approximately 1800 ha in the very-low habitat value state. It is not until approximately 100 years after harvesting that the forest canopy is assumed to re-open and herb and shrub abundance will increase sufficiently to increase the habitat value again. These assumptions are based on past and current management practices and do not include the potential for silvicultural practices such as cluster planting or spacing to create canopy gaps for herb and shrub production during the stand rotation. It should also be noted that this analysis is based only on the past and current harvesting plans and does not include any harvesting occurring after approximately 2005.

Preliminary analysis of the hair trapping samples indicates that we were unable to attract grizzly bears to our baited sites during the fall trapping sessions. Over 15 hair samples were obtained that were identified to be black bears and four were identified as possibly wolf. One brown coloured guard hair was obtained from one site, but it cannot be positively identified based on sight as grizzly bear and it is too small a sample to use for DNA analysis.

MANAGEMENT RECOMMENDATIONS

There are a number of management recommendations that can provide resource managers with measures to protect important grizzly bear habitats and provide opportunities to maintain an adequate supply of high value habitats for grizzly bear use. These management strategies are outlined below and where practical, they have been outlined on Figure 4.

- Avoid placing roads and proposed harvest areas adjacent or through known important grizzly bear habitats such as riparian floodplains, wet skunk cabbage sites, wet herb meadows and sedge meadows. If possible maintain a 50 – 100 m forested buffer on the above habitats that are larger than 2 ha. This will act as both a visual screen and provide security cover for bears that may be using those sites (outlined in orange in Figure 4).
- During block layout, place as many important grizzly bear habitat types such as wet herb meadows, sedge meadows, and wet skunk cabbage sites that are found by the layout crew in wildlife tree patches or riparian management areas sufficient in size to maintain the thermal and moisture requirements of those sites (outlined as polygons containing important bear habitats in Figure 4). Utilize timbered buffers and feathered edges on these sites, incorporate them into existing riparian management areas, and maintain feeder streams, etc. so that these sites don't dry out.
- When designing cutblocks, use partial harvesting (% basal area removal) or small clearcut (1-2 ha) with reserve silviculture systems that provide a mosaic of structure and age.
- Provide connectivity from upland sub-alpine and alpine areas to the lower elevation riparian and floodplain forests through the use of wildlife corridors along riparian areas and along ridgelines (ridgeline corridors outlined in green in Figure 4). The riparian and ridgeline corridors should be maintained as areas of high canopy closure with few openings larger than 2-5 ha. Block and spur roads and skid trails may cross these areas, but extensive clear-cuts should be avoided. Feathering of edges adjacent to these corridors should be done to reduce windthrow where clear-cut or where partial harvesting is greater than 70% basal area removal. It should be noted that the riparian corridors are not shown on the maps. Streams and the Nangeese River should have adequate buffers to maintain the riparian habitats that exceed the FPC Riparian Guidelines where possible.
- During stand initiation and management, use the suggestions found in the Grizzly Bear Silviculture Guidelines such as cluster planting, variable density spacing and pre-commercial thinning to provide herb and shrub production throughout the life of the stand. Ensure that berry producing shrub species such as blueberries, huckleberries, devil's club, elderberry, salmonberry etc. are maintained within harvested areas are not removed through vegetation management practices.
- During road layout, limit road widths, avoid extensive sight lines and limit the use of legumes and clovers in grass seed mixtures that may attract bears to roads (outlined in pink in Figure 4).
- Deactivate main roads (outlined in pink in Figure 4) by removing bridges, un-building sections adjacent to important habitats and re-piling waste piles on the road-bed as soon as possible after harvesting to reduce impacts to grizzly habitats from road use.
- Avoid timber harvesting and road building activities during the spring green-up period (June) and during salmon (August to October) spawning periods if roads or harvest areas are near the Nangeese or Sweetin Rivers.

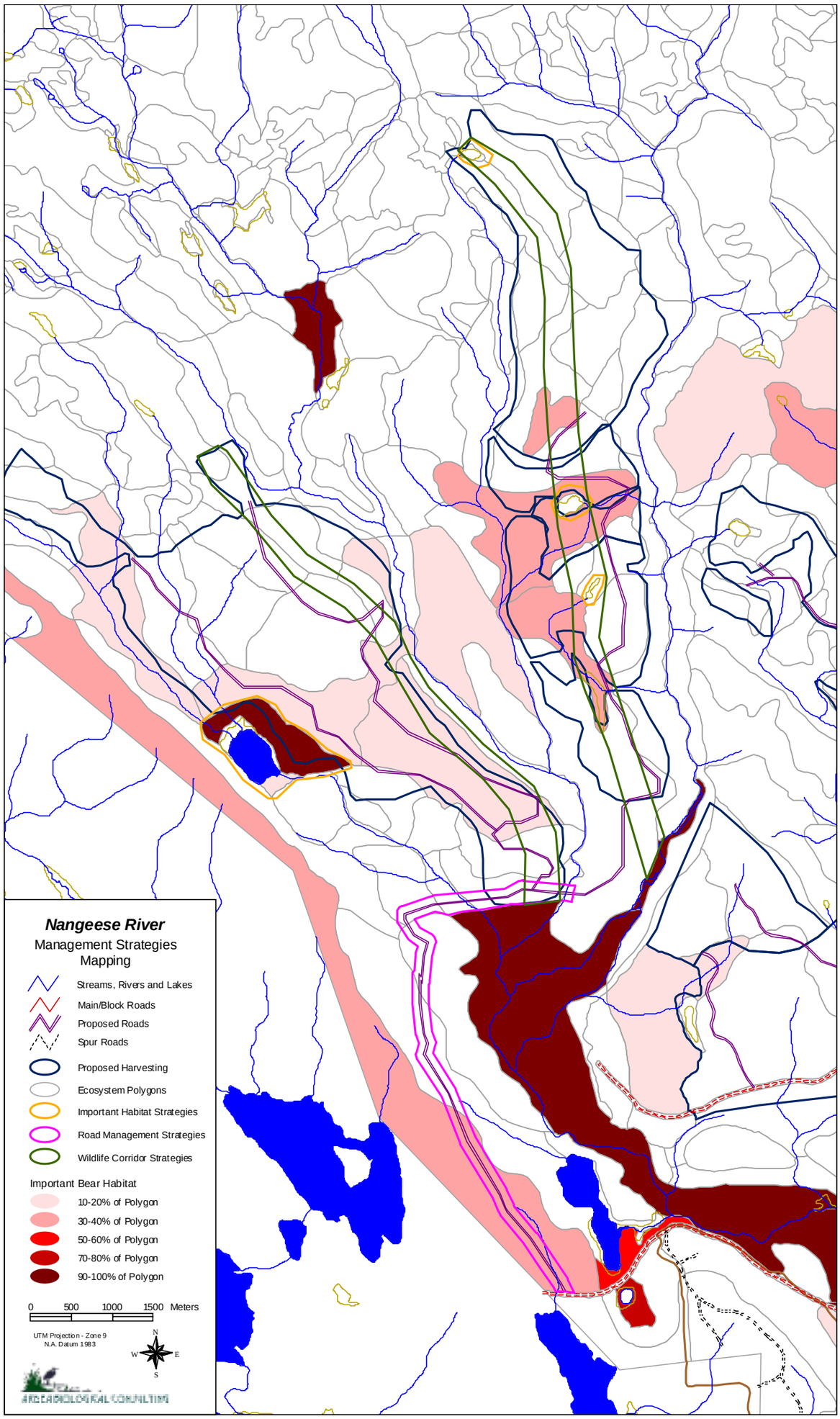

Figure 4. Outline of areas for proposed management strategies - Nangeese River study area.