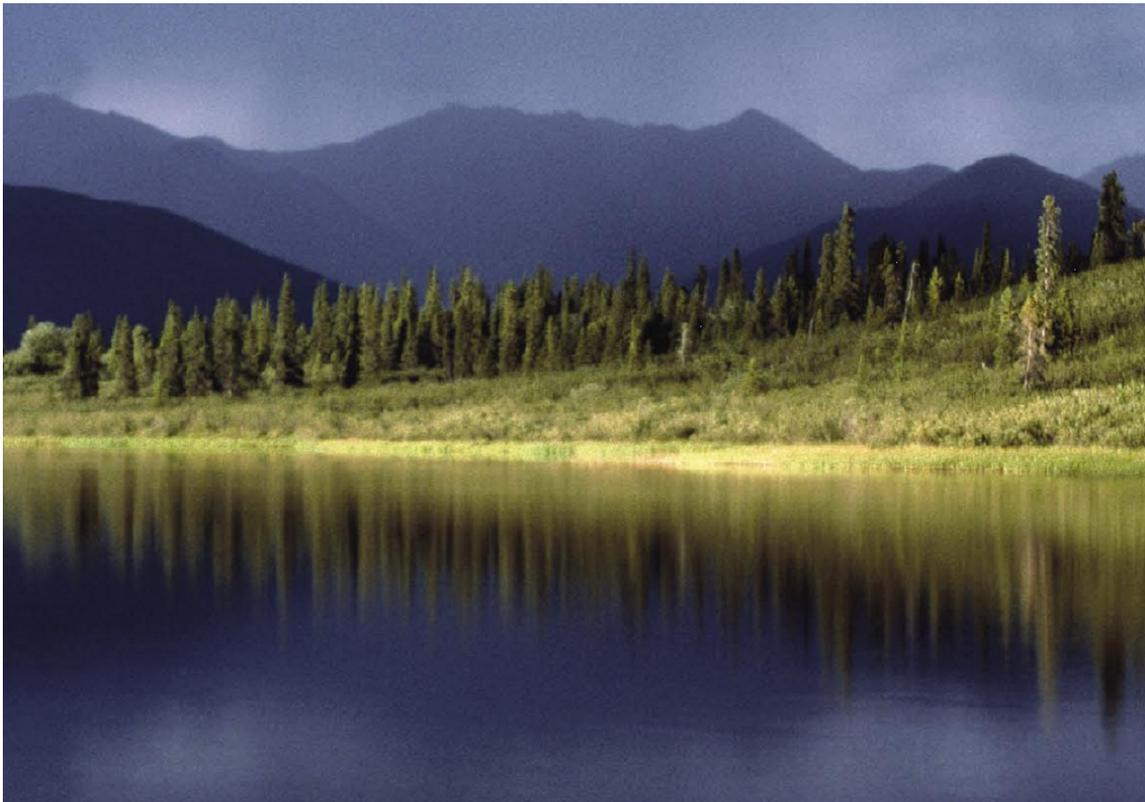




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PLANNING COMMISSION
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Conservation Priorities Assessment CRITERIA AND INDICATORS REPORT

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Introduction

This report outlines and explains the key elements of the Conservation Priorities Assessment process for the Peel Watershed Planning Commission (PWPC). Its purpose is to make the process as clear as possible to the Commission members, communities, parties, other interest groups, and the public. The PWPC Conservation Assessment Technical Advisory Group has collectively written this document.

The PWPC's statement of intent says that: "The goal of the Peel watershed land use plan is to ensure wilderness characteristics, wildlife and their habitats, cultural resources, and waters are maintained over time while managing resource use". The General Terms of Reference for the PWPC, along with a number of the submissions from interest groups, clearly indicate that conservation of land, water, wildlife, and fish must be actively considered by the Commission, and that, in doing so, the Commission should make recommendations regarding potential protected areas within the plan area (PWPC 2005. Issues and Interests Report). Other management measures will also be considered to address conservation values for those areas that fall outside proposed protected areas. The Conservation Priorities Assessment is the technical process of gathering pertinent information regarding land, water, wildlife and fish resources; analysing this information to identify areas of high ecological value; and representing the information and results on maps. It is conducted independent of other resource assessments so that PWPC will have the best available information on conservation values to consider with other values when making its land use recommendations.

The Conservation Priorities Assessment is informed by science in both the objective analysis of technical data on these resource values, and in what the science of conservation biology says are key ecological characteristics and features of the resource. The Assessment is also informed by public, local community and First Nations knowledge and values. The "criteria" are the values, issues and interests expressed by First Nations communities, public interest groups, and conservation biology science. The "indicators" are the measurable features in the natural world that can represent the criteria on maps.

The Conservation Priorities Assessment largely fits in the information gathering stage of the PWPC planning process. We plan to complete the information gathering for this Conservation Priorities Assessment by April 2007. The analysis portion of the Assessment will follow, and may partly overlap the Commission's involvement in evaluating and recommending land use outcomes. This report introduces the Conservation Priorities Assessment. It lists the criteria and indicators, and briefly explains how data are gathered, presented, and analysed. It also comments on land use zoning, the key way the Commission can apply the results. PWPC technical staff will summarize the information gathered for this Assessment in a set of themed maps for Commission and community review. We will also present more detail on the sources, nature, and means of analysing the data (the details behind the maps) as part of the Resource Assessment Report (due in September 2007).

Choice of Criteria and Indicators

The natural world is marvelously rich in species, communities and ecosystems, and in the variety of forces that change them. All of these elements live or function at different scales in space and time. Conserving diversity is extremely complex unless we pull out certain elements or processes (i.e. criteria) that have the most influence, or best represent a suite of other elements, or are the most difficult to conserve. The science of conservation biology provides direction in choosing certain ecological criteria (elements and processes) and potential indicators for those criteria.

At the same time, people and communities living within, close to, or even sometimes quite far from the plan area, have a special interest in conservation, especially as it relates to their livelihoods and healthy ways of life. The values and interests expressed by these communities through the public consultation process are another important source of conservation criteria.

The Peel Watershed is mostly undeveloped, difficult to access, and with relatively little history of exploration. These features enhance its conservation potential, but also mean that we know relatively little about it compared with many other regions. In historic times, few people have lived in the plan area for any appreciable periods of time, and scientists have infrequently had cause to visit, record and study the land, water, fish and wildlife. There are currently no permanent residents within the plan area. The Conservation Assessment relies on information provided by those who most often have lived and traveled in the region - the First Nations communities and the trappers and guide-outfitters who use the land. It also relies on compilation of scientific information collected by the Yukon Department of Environment, Environment Canada, Fisheries and Oceans Canada, and scientists of independent groups such as Ducks Unlimited and the Canadian Parks and Wilderness Society. Even so, some of the information is patchy and incomplete. For example, scientists have not thoroughly documented the distributions of rare organisms, nor even of some of the more common organisms of interest such as fish. Lacking detailed quantitative data on what habitats some indicator species select, our habitat modeling is sometimes less detailed than would be ideal, and somewhat reliant on extrapolation from other portions of the Yukon. Certain portions of the plan area are very rarely visited by people, including First Nations members, so even less is known about those areas. However, other resource assessment (e.g., minerals, tourism) also suffer from the same lack of detailed data as the conservation assessment. All are clouded with substantial uncertainties, a background reality that the Commission has to deal with throughout.

In this Report we outline the issues and interests (i.e. criteria) provided by the public consultation process, through the PWPC Issues and Interests Report. We do the same for criteria identified by the science of conservation biology. We identify the indicator that will reflect each criterion spatially, and provide a unit of measurement, some rationale, and a source of data for that indicator. Frequently the relative value of an indicator is mapped as habitat suitability. Suitability mapping is a way of portraying the relative quality of different habitats (mostly biophysical land cover classes) for a species. We do this on a four point scale (nil, low, moderate, and high quality).

Land Use Zonation

Land use zones are the principal tool planners and managers have for ensuring the sustainability and utility of resource values across a region. It is not possible to integrate all possible land uses within small geographic areas. Most human activities have a sphere of influence on the land beyond the immediate site of action (e.g. a road corridor or mine site). Some also require an area around the site where other uses are excluded in order to provide the optimum experience of the site (e.g., a hunting trip, or scenic travel corridor). Considering conservation, it is well known that population viability and habitat accessibility for many wildlife species decreases directly, or indirectly, as a result of human activities. For example, travel corridors used by people can directly displace some species from local habitats, directly influence population viability through road-kill, or indirectly influence population viability by

increasing access for hunters and other predators. Consequently, planners have repeatedly resorted to zoning as a key tool for allowing diverse land uses to co-exist in a large region, but without directly impinging on each other. For conservation purposes, protected areas are a key land use zone for areas with the highest ecological value. Conservation objectives can also be accomplished in other land use zones with varying levels of protection, by managing human activities in time, place, or intensity based on knowledge of thresholds above which human activities cannot be accommodated

Land use zones being considered by the Peel Watershed planning process are Protected Areas, Conservation Zones, General Management Zones, and Resource Management Zones. **Protected Areas** would preclude many human activities, most importantly roads, and could range in size from whole third or fourth-order watersheds to small feature-specific parcels embedded in other zones. **Conservation Zones** would have a strong emphasis on biodiversity conservation and ecological integrity, constraining other land uses within bounds of timing, placement, and frequency or intensity of occurrence. **General Management Zones** would be open to most human activity within bounds applied to general regulations and legislation across the Yukon Territory. Special management objectives in this zone may be identified through regional, sub-regional, or sectoral planning. In the **Resource Management Zones**, it is acknowledged that human activities will focus on specific high intensity resource uses, such as mine development, or settlements. In these zones conservation opportunities are minimal, and local land tenure licenses may allow human activities that are not permitted elsewhere.

Conservation of biodiversity must be integrated through all zones, using the various indicators we are using in the Conservation Assessment process, and the indicators employed by other resource assessment processes. The integration is the essence of Goal 4.2 of the PWPC Terms of Reference, which states that the Plan will “recommend measures to minimize actual or potential land use conflicts throughout the planning region”.

Identifying Conservation Indicators

A Conservation Priorities Assessment uses certain Indicators to represent spatially a set of values and interests, which are called Criteria. For a concise summary of these Criteria, we look to the objectives of the Peel Watershed Planning Commission (as outlined in the Commission’s General Terms of Reference), and to the various values and interests promoted by the communities and general public (as outlined in the PWPC Issues and Interests Report). We do the same for criteria identified by the science of conservation biology. We identify the indicator that will reflect each criterion spatially, and provide some rationale and a source of data for that indicator. This information is summarized in the following section. *Public Consultation Criteria and Indicators*

The Issues and Interests Report summarizes public consultation regarding conservation mainly within 2 Goals, each of which has a number of Actions. These Goals correspond well with General Goals for the PWPC in its Terms of Reference (in brackets). Under Goal 1, the Action stated as “identify conservation values”, is deemed to be the entire Conservation Priorities Assessment.

Goal 1: Recognize all ecological values, their components and their integrated function

General Terms of Reference goal 4.6 - takes into account that the management of land, water and resources, including fish, wildlife and their habitats, is to be integrated.

ACTION (i.e. Criterion)	INDICATOR	UNIT OF MEASUREMENT	RATIONALE	SOURCE OF INFORMATION
Manage and protect fish and wildlife populations and habitat	Fish species distribution and genetic diversity & Fish habitat suitability	Point locations of all fish records by species or genetic race & Creek and river course reaches and lakes ranked on 3 point scale (nil, low, high)	Distribution is the primary information for assessing diversity by watershed. Habitat suitability gives a comprehensive coverage of water bodies.	Anderton, I. 2006. Peel River Watershed Fisheries Information Summary Report. Environmental Dynamics Incorporated, Whitehorse. (PWPC webpage)
	Habitats mapped as land cover classes (combination of surface terrain and plant community) on a 1:50,000 biophysical map, in combination with a map of ecoregions.	The area covered by any one land cover class within an ecoregion as a proportion of the total area in that ecoregion. This gives an index of rarity and representation for each cover class.	A land cover map is a cost-effective catalogue of all the principal land cover classes, which, with other attributes, such as topography, can be classed as habitats or ecosystems	Biophysical Map of land cover classes produced from Landsat EOSD by Yukon Environment Habitat Branch. & Ecoregions of the Yukon data layer provided by Geomatics Yukon.
	Caribou range for each herd.& Caribou critical habitats for each herd. & Caribou habitat suitability for entire plan area.	Polygon outlining area historically used by each herd & Polygons outlining highly valuable habitats & Suitability rankings from nil to high for each cover class.	Plan area includes range of boreal woodland, barren-ground (Porcupine), and mountain woodland caribou (Bonnet Plume, Hart River, Redstone herds). Caribou are prime interest for subsistence and other hunters and have high community value (below). They are vulnerable to disturbance and indirect impacts of human activity.	Yukon Environment Wildlife Branch staff for: -geographical ranges of herds based on radio-collared animals -critical habitats from Key Wildlife Areas database. -habitat suitability ratings & Community workshops / interviews to ask local experts about -habitat ratings for each biophysical habitat land class important seasonal habitats
	Moose critical habitats & habitat suitability	Polygons outlining highly valuable habitats & Suitability rankings from nil to high for each cover class.	Moose are valuable local source of food, and indicator for the spatial extent of riparian habitats	Yukon Environment Wildlife Branch, and NWT Dept of Environment Wildlife Branch staff for: -winter distribution of moose from aerial surveys -critical habitats from Key Wildlife Areas database. -habitat suitability ratings & Community workshops / interviews to ask local experts about: -habitat ratings for each biophysical habitat land class -important seasonal habitats
	Marten critical habitats & habitat suitability	Polygons outlining highly valuable habitats (& Suitability rankings from nil to high for each cover class.	Furbearers are valuable resource for local communities, and marten is one of the most important species trapped.	Yukon Environment Wildlife Branch staff for: -critical habitats from Key Wildlife Areas database. -habitat suitability ratings & Community workshops / interviews to ask local experts about: -habitat ratings for each biophysical habitat land class -important seasonal habitats

Goal 1: Recognize all ecological values, their components and their integrated function cont'd

ACTION (i.e. Criterion)	INDICATOR	UNIT OF MEASUREMENT	RATIONALE	SOURCE OF INFORMATION
<p>Manage and protect fish and wildlife populations and habitat (cont.)</p>	<p>Grizzly bear critical habitats & habitat suitability</p>	<p>Polygons outlining highly valuable habitats & Suitability rankings from nil to high for each cover class.</p>	<p>Grizzly bears tend to avoid humans, use a wide-range of habitats, and their population status is a good measure of how intact large wilderness areas remain.</p>	<p>Interviews with guide-outfitters regarding grizzly bear habitat use. & Yukon Environment Wildlife Branch staff for: - critical habitats from Key Wildlife Areas database. - habitat suitability ratings. & MacHutchon, A.G. 1997. Grizzly bear habitat evaluation, Snake River valley, CPAWS Res. Rep.#3.</p>
	<p>Peregrine falcon nesting and foraging habitats</p>	<p>Moderate & high suitability nesting habitat buffered by 2 km & Likely foraging habitat around nesting habitat</p>	<p>Peregrine falcons are top predators in bird-wetland ecosystems, and are a threatened species requiring attention under the Species at Risk Act.</p>	<p>Inventory of peregrine falcon nest sites from Dave Mossop, Yukon College. & Expert opinion maps of suitable nesting and foraging habitats, with appropriate buffers around nesting cliffs, based on published science on zones of use and influences of disturbance.</p>
	<p>Waterfowl nesting and staging habitats</p>	<p>Moderate & high suitability nesting and staging habitats buffered by 2 km</p>	<p>Lakes and wetlands are uncommon ecosystems in the plan area, but essential habitats for waterfowl. Some concentrations of lakes (Turner & Vittrekwa) provide high local value for nesting and migratory staging.</p>	<p>Environment Canada and Ducks Unlimited staff for inventories of waterfowl abundance and distribution by season. & Yukon Environment Wildlife Branch staff for critical habitats from Key Wildlife Areas database.</p>
	<p>Breeding bird diversity by biophysical land cover class (i.e. habitat) & Breeding bird land cover class (habitat) specialization</p>	<p>Index of breeding bird species richness for each biophysical land cover class & Ranking of land cover classes by number of breeding birds that are specialists in each cover class.</p>	<p>Birds occupy all biophysical land classes, and their general habitat affinities are relatively well known. They can give a comprehensive overview of biodiversity. Also, some are habitat specialists, indicating high value for the focal habitat.</p>	<p>Environment Canada and Yukon Environment biologists to provide an expert opinion matrix that covers breeding bird distribution by biophysical land cover class. Birds that occupy few cover classes will be defined as habitat specialists.</p>
	<p>Species at risk occurrence locations & Likelihood of occurrence ranking by land cover class for plants at risk. & Likelihood of occurrence ranking by land cover class for birds at risk.</p>	<p>Point locations of all rare elements & Ranking of all land cover classes (biophysical map) as low, medium or high likelihood of occurrence of plants at risk. & Ranking of all land cover classes (biophysical map) as low, medium or high likelihood of occurrence of birds at risk.</p>	<p>Species at risk identified by the federal Species at Risk Act process, or the Yukon Wildlife Act process, require protection of critical habitats.</p>	<p>National General Status Working Group provides listings of species "at risk" (http://www.wildspecies.ca). NatureServe Yukon (through Yukon Environment staff) to provide location data for rare species occurrences through the plan area. Expert opinion likelihood of occurrence rankings based on existing locations, and published literature on habitat affinities.</p>

Goal 1: Recognize all ecological values, their components and their integrated function cont'd

ACTION (i.e. Criterion)	INDICATOR	UNIT OF MEASUREMENT	RATIONALE	SOURCE OF INFORMATION
Regional conservation values such as special ecological features and wilderness and cultural values require evaluating and addressing.	Integrity of wilderness ecology , being an absence of human-affected ecosystems	Map of existing wilderness, which is all areas >2 km from human infrastructure and sites of repeated use (roads, camps, strips, boating corridors, etc.), & Area (ha) of all human infrastructure and repeated use (including a 2 km buffer), as a proportion of the total area of each watershed.	The region is currently mostly wilderness, and its wildlife and ecosystems reflect the relative lack of human intervention. Maintaining the integrity of this wilderness is a stated goal of the planning process.	Yukon Geomatics for current inventory of human infrastructure, plus delineation of commonly-used boating routes.
Regional conservation values such as special ecological features and wilderness and cultural values require evaluating and addressing. (cont.)	Areas with high subsistence value to First Nations (Note: this indicator does not satisfy all aspects of this Action (Criterion); other aspects will be addressed in the Heritage, Outfitting and Recreation Assessments).	Polygons outlining areas of high value	First Nations communities have traditional areas of subsistence harvesting (meat and plants), often associated with higher wildlife productivity.	Community workshops and focused interviews in Mayo, Dawson and Fort McPherson to map important harvesting areas and areas of high wildlife productivity (Information collated, mapped and reported by First Nations government staff)

Goal 2: Recognize and promote the cultural values of the affected First Nations

General Terms of Reference goal 4.1 - Promotes the well being of the affected First Nations, other residents of the planning region, the communities and the Yukon as a whole, while having regard to the interest of other Canadians.

ACTION (i.e. Criterion)	INDICATOR	UNIT OF MEASUREMENT	RATIONALE	SOURCE OF INFORMATION
Protect and provide opportunities for a subsistence lifestyle and harvest (fish and game, berries, timber)	Sites and areas of high value for subsistence harvest & Seral stage mapping & Mapping of fish and game habitat suitabilities (see Goal 1 above)	Polygons outlining areas of high value & Percentage of each seral stage in a watershed & Suitability rankings from nil to high for each cover class.	First Nations have traditional areas where they harvest resources & The value of harvest areas changes with changes in vegetation communities following wild fire. Diverse zones of protection provide best long-term subsistence opportunities.	Community workshops and focused interviews in Mayo, Dawson and Fort McPherson to map important subsistence use areas for the communities (Information collated, mapped and reported by First Nations government staff) & Community workshops to gather local expert opinion on wildlife habitat suitability. & Geomatics Yukon for fire history mapping.
Protect heritage and cultural sites	<i>This Criterion will be addressed in the Heritage Assessment.</i>			

Conservation Biology Criteria and Indicators

Biologists have expended considerable effort in the last few decades researching ways to conserve the huge variety of species, and the range of natural processes that maintain those species, in landscapes through time and space. The result is a list of criteria that need to be actively considered when planning for conservation of biodiversity (see Groves, C.R. 2003. *Drafting a Conservation Blueprint: A practitioner's guide to planning for biodiversity*. Island Press, Washington). The following table outlines these criteria as actions, along with the indicators, rationale and data sources for assessing these criteria. Generally speaking these indicators are the same as those suggested through the public consultation process. For focal species, this reflects the fact that substantial data exist only for species of high public and community interest, and so these are naturally the ones brought forward for consideration. The overlap also reflects the general understanding of many public members and interest groups about biodiversity conservation. Under "Indicator" there is frequent reference to "spatial unit", which is the subdivision of the landscape (e.g., 3rd-order watershed or equal area grid cell) within which all indicators will be summed to search for areas of relative richness across indicators.

ACTION (i.e. Criterion)	INDICATOR	UNIT OF MEASUREMENT	RATIONALE	SOURCE OF INFORMATION
Conserve the full range of ecosystem types	Biophysical land classes (surrogate for ecosystem) by Ecoregion or by Zones covered or uncovered by Wisconsinan glaciation .	Percent of an ecoregion, or glaciated and unglaciated zone, covered by a biophysical land class & Watersheds with greatest diversity of combinations of land class by ecoregion and zone of glaciation.	Ecoregions differ in their landforms, climate & history of glaciation, and therefore can be expected to hold different suites of plants within any one biophysical land class. Biophysical land classes differ because of their soils and plants, so represent broad habitats or ecosystems.	Geomatics Yukon for ecoregion mapping, and zones of glaciation. Yukon Environment Habitat Branch for the biophysical land class mapping (1:50,000 from Landsat EOSD).
Conserve ecosystems at spatial scales encompassing the full range of natural disturbance patterns.	Frequency distribution of fire sizes & Watershed units	Mean and range of documented fire sizes in the drainage & Mean and range of watershed sizes by stream order	Biophysical land classes (ecosystems) change because of disturbances. An area can best conserve all species when its size is considerably larger than the size range of disturbances. Wildfire creates the largest disturbances in the boreal forest, so the mean and range of fire sizes helps decide how large an ideal protected area would be. In water systems, upstream events change downstream ecosystems by flooding, siltation, erosion, etc., so planning around watersheds is the best way to maintain these processes.	Geomatics Yukon for fire history mapping. PWPC staff for watershed and stream order map layers, from federal government National Topographic Series 1:50,000 mapping.
Conserve a suite of species whose use of space & ecosystems reflects the full range of space use by all species, and the full range of ecosystem types. (cont'd)	Fish distribution & Genetic lineages within species	Regions with genetically distinct populations within each species	Northern lakes and rivers support relatively few fish species, but the mix of species and their genetic lineages in any one water body strongly reflects glacial and hydrological history, presence of other species, and productivity. Fish populations can be easily over-harvested, and affected by changes in flow regime and water quality.	Anderton, I. 2006. Peel River Watershed Fisheries Information Summary Report. Environmental Dynamics Incorporated, Whitehorse. (PWPC webpage)

ACTION (i.e. Criterion)	INDICATOR	UNIT OF MEASUREMENT	RATIONALE	SOURCE OF INFORMATION
Conserve rare species and/or species with very restricted habitat affinities	Occurrences of species at risk & Likelihood of occurrence ranking by land cover class for plants at risk.	Point locations of rare elements & Ranking of all land cover classes (biophysical map) as low, medium or high likelihood of occurrence of plants at risk.	Some species are at risk because they are rare, or have localized or restricted distributions. These species may not be covered by conservation aimed at wider ranging species or ecosystems. To the extent that they have been documented, their specific locations need to be considered. Some are officially listed under the Species at Risk Act, and the territory is obliged to plan for their conservation.	National General Status Working Group provides listings of species "at risk" (http://www.wildspecies.ca). NatureServe Yukon (through Yukon Environment staff) to provide location data for rare species occurrences. Expert opinion likelihood of occurrence rankings based on existing locations, and published literature on habitat affinities.
Conserve unusual or particularly localized abiotic and biotic features ("special features")	Hotspots & Mineral licks & Prominent game trails & Canyons	Point locations of special elements Or Percentage of each spatial unit covered by special elements (when each is buffered by 2 km)	Wildlife responds to localized habitat hotspots, such as mineral licks, canyons, and passes, because these special features provide limited nutrients, travel corridors, nesting habitats or other requirements. These special features deserve consideration for inclusion in protected areas, or for special management in other zones.	Yukon Environment staff for mapped mineral licks in Wildlife Key Areas database & Focused interviews with trappers, guide-outfitters, and others who know the plan area (Information collated, mapped and reported by Yukon Environment and PWPC staff) & Community workshops to gather local expert opinion on special features.
Conserve biodiversity in the face of climate change	Projected change in climatic conditions by landscape unit	Degree of deviation of projected climate domains from historical patterns, by watershed	Climate change will induce shifts in species distribution as portions of their range become less habitable and new areas can be colonized. Colonization often requires connectivity, and connectivity south to north, and down-slope to up-slope, will be essential to facilitate the colonization.	Published literature and models with regional projections of how changing climate will cause deviations to new climate domains, or shifts of existing domains..
	Recent trends in climate and water regimes		Watersheds which are more extreme in mean values for recent climate data, or river flow regimes, may be less resilient to future changes. Need to compare major watersheds where possible, and make inference from prevailing patterns of precipitation and temperature across the plan area.	Few data are available. May be able to use Environment Canada (Water Survey) hydrometric station data regarding water flow regimes. & Interviews with knowledgeable individuals.