RESOURCE ATLAS FOR PLANNING UNDER THE ATLIN-TAKU FRAMEWORK AGREEMENT

Version 1.5
August, 2009

ACKNOWLEDGEMENTS

This Atlas was compiled with contributions from many people. Of particular note, maps were produced by Shawn Reed and Darin Welch with the assistance of Dave Amirault, Integrated Land Management Bureau. Descriptive information was mainly based on the report Atlin-Taku Planning Area Background Report: An Overview of Natural, Cultural, and Socio-Economic Features, Land Uses and Resources Management (Horn and Tamblyn 2002), Government of BC websites, and for wildlife the joint Wildlife Habitat Mapping Information Handout May 2009.

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INTRODUCTION

Sharing of resource information is one of the first steps in developing a common understanding of the land and its resources. With detailed resource information available, discussion of the use of the land and these resources can take place. To facilitate this sharing, The Resource Atlas for planning under the Atlin-Taku Framework Agreement has been developed.

The Framework Agreement Between the Taku River Tlingit First Nation and the Province of British Columbia for Shared Decision Making Respecting Land Use and Wildlife Management was signed in March 2008. Part of the implementation of the Framework Agreement is a land use plan.

Note: The Atlas is an evolving document and additional maps will be added to the resource atlas as appropriate. For instance, new layers may be added when planning products require additional new information or when products from analysis are produced during the development of a completed plan.

The Atlas maps, and to some extent describes, the land and resource values in the Atlin-Taku area using the best available information. Data is provided for the Land Use Plan area for most maps (1-23) except the wildlife habitat suitability maps (24-34). For these maps, the data covers the larger Collaborative Fish and Wildlife Management Plan Area. Both of these areas are included in the Framework Agreement.

The Atlas is intended for use by the Atlin-Taku Joint Land Forum and its support team, as well as participants at Atlin Taku multi-party workshops. It is intended to inform discussions surrounding the land use agreement. The Atlas will also be available to the general public for review with associated maps posted to the project website (http://ilmbwww.gov.bc.ca/slrp/lrmp/smithers/atlin_taku). Poster sized versions of each Atlas map have been produced and are available for more detailed reference during planning exercises (open houses and workshops) and analysis.

GENERAL PLAN AREA DESCRIPTION

The plan area is a remote and largely unroaded area in the northwestern corner of BC. The land use planning area boundary includes the Canadian portion of the Taku watershed and the BC portion of the Yukon watersheds. The western boundary of the plan area adjoins the Alaska Panhandle near the Chilkoot Pass and the northern boundary follows the border with the Yukon Territory. Other portions of the boundary correspond with the Taku River Tlingit First Nations Statement of Intent Area, the area for which the First Nation has filed for treaty negotiation purposes. The total size of the land use planning area is approximately 3.04 million hectares or 30 409 km^2.

This area includes the Teslin lowlands and Teslin lake, east of Gladys Lake.

The Atlin - Taku area is geographically complex, extending from the Coast Mountains inland almost to Watson Lake. The interior part of the plan area is composed of a mixture of low mountains and large plateaus. Landsat satellite imagery shown in Map 2 and the hillshaded terrain in Map 3 give an indication of the geography of the plan area.

The Collaborative Fish and Wildlife Management Plan Area is the Taku River Tlingit First Nation statement of intent area; the area defined for treaty negotiation purposes. This area overlaps with other First Nations traditional territories; including the Carcross Tagish, the Teslin Tlingit, and Tahltan First Nations. The Carcross Tagish First Nation traditional territory covers the northwest corner of the planning area, west of Atlin Lake. The Teslin Tlingit First Nation traditional territory covers an area surrounding Tagish Lake, within the planning area.The Tahltan First Nation traditional territory covers roughly the lower one-third of the planning area. Map 9 details First Nations Statement of Intent Areas and Traditional Territories.

Other than small and scattered settlements, the only sizable community and commercial centre in the Atlin-Taku plan area is the town of Atlin, on the eastern shores of Atlin Lake, population approximately 450. Many Taku River Tlingit live on the Five Mile Point Indian Reserve No. 3 about 8 km south of Atlin.

MAP 1: BASE INFORMATION

Showing and annotating basic topographic land features such as rivers, lakes, roads and mountains, the base map orients map readers to the plan area. Major rivers in the plan area include the Taku, Nakina, Inklin and Sheslay Rivers. There is a complex of large lakes, including Atlin and Tagish Lakes that feed the Yukon River watershed. Fed by the Llewellyn Glacier, Atlin Lake is the largest natural lake in BC and forms the headwaters of the Yukon drainage.

The plan area is further divided into two additional sub-planning units, the Collaborative Fish and Wildlife Planning area, 39 504 km^2, and the Local Access Plan area, 2 852 km^2 or approximately 7% of the land use plan area.

> Uses in Planning: For identifying locations of interest within the study area; recording new information by sketching it to the map

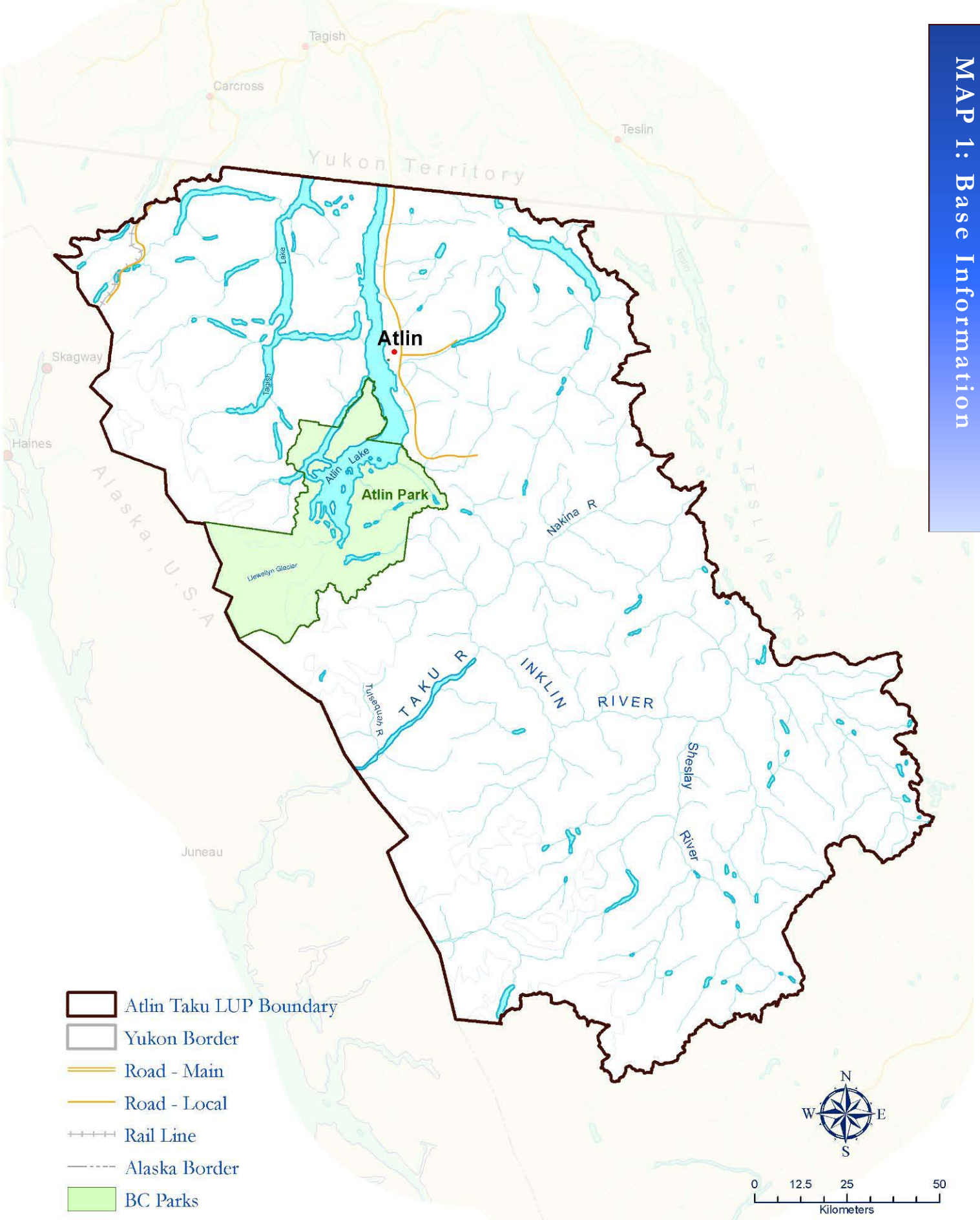
Road Inventory

Roads data is obtained from the provincial roads atlas. To ensure accuracy in the road inventory of the plan area, the secondary roads in this dataset were augmented with up-to-date road information generated from 2006 satellite imagery. The majority of roads in the plan area surround the community of Atlin with Atlin Road providing the only ground access to the town. The Alaska Highway (Highway 97 in B.C. and Highway 1 in the Yukon) is a paved road, which dips into BC and parallels Swift River before heading north into the Yukon again east of Teslin Lake. The South Klondike Highway connecting the Alaska Highway to Skagway, Alaska, passes through the northwest corner of the plan area. Portions of other roads maintained by provincial government include the Surprise Lake Road, Lake O'Donnell Road, and Ruffiner Mine Road (Macdonald Lake Road). There is one existing major mine road within the south eastern portion of the plan area that leads to the Golden Bear mine site.

There is a total of 1 438 km^2 of roads in the plan area. The roads dataset is classified by type into 3 classes: paved, unpaved and deactivated.

> Uses in Planning: Identifies areas with easier access for further development and potentially increased pressure on multiple resource values; the road network will provide important information in developing a Local Access Plan for recreation and resource use.

MAP 1: Base Information

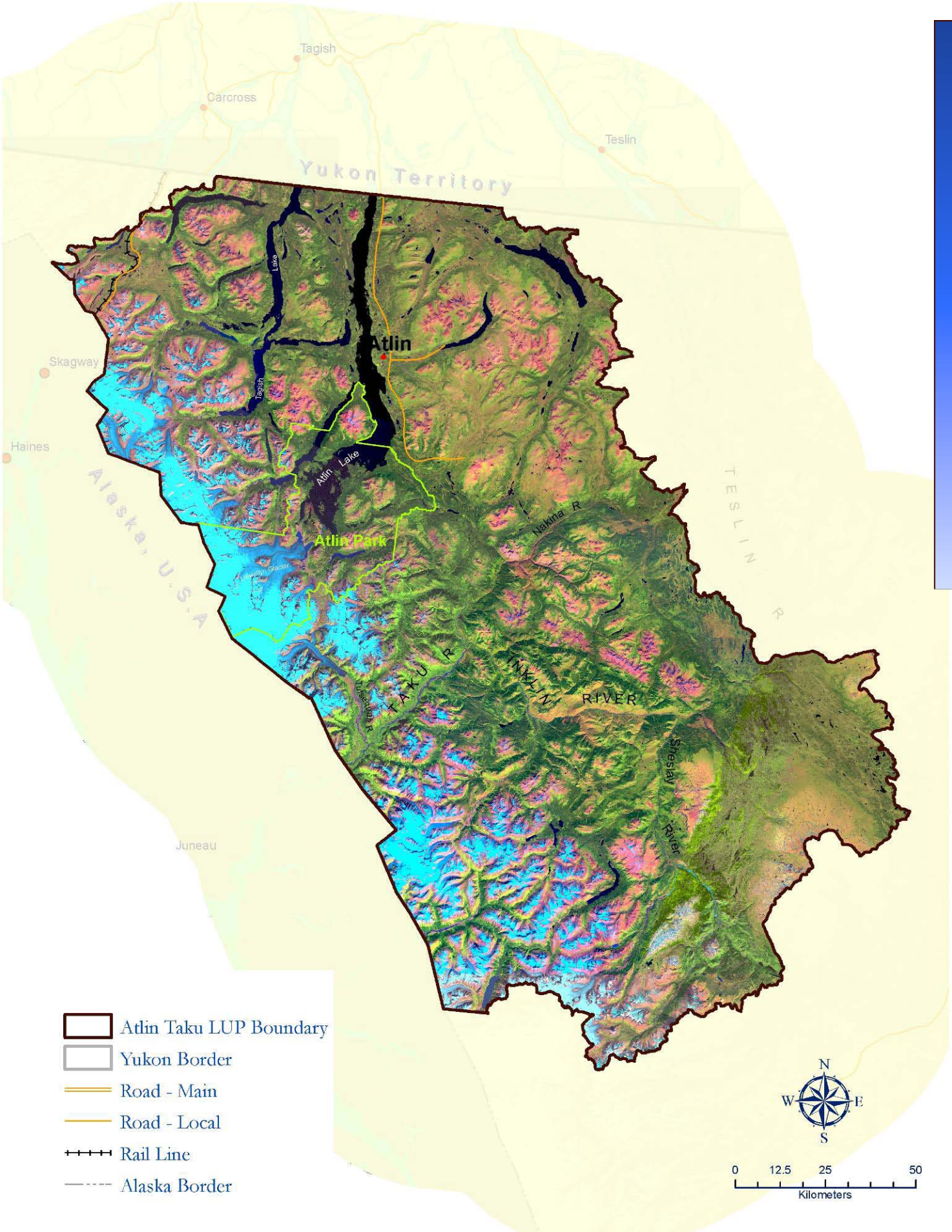


MAP 2: SATELLITE IMAGE

Aerial and satellite images, known as remotely sensed images, provide an accurate picture of land cover and can help to make landscape features understandable on regional, continental, and even global scales. The satellite image used in this map is a colour enhanced mosaic of Landsat images taken of plan area between 1999 and 2004. The satellite images use Bands 5, 4, and 3 (Shortwave IR, Near Infrared, and Red) to create a false colour image. Lakes appear black, glaciers as cyan and alpine and rock as reddish brown. Lower elevations are generally shades of green.

> Uses in Planning: Can be used during the land use planning process to provide a different context of the land to better orient discussions within the plan area.

MAP 2: Satellite Image Map

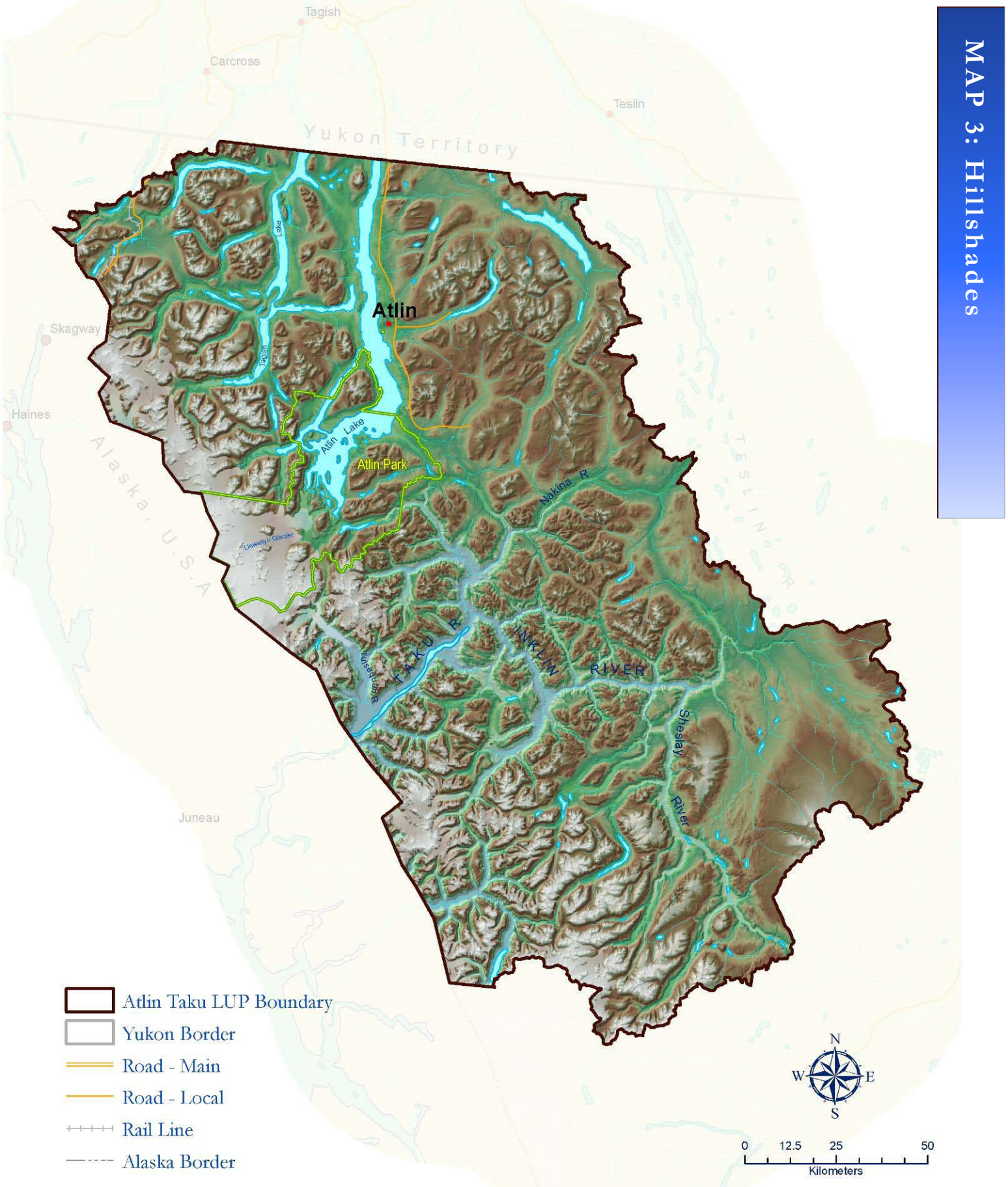


MAP 3: HILLSHADES

A hillshaded map shows terrain in pseudo 3-D form where hillsides and mountains are shaded with shaded colours relative to a theoretical light source (i.e., the sun). The map conveys a different picture of the plan area landscape that some readers find easier to recognize and relate to areas that they are familiar with. Hillshades can be effectively applied to other map themes to show them in pseudo 3-D style.

> Uses in Planning: An alternate view of the plan area for identifying locations of interest within the study area.

MAP 3: Hillshades



MAP 4: LAND STATUS AND LICENSES

The population of northern BC is characterized by small, unincorporated communities separated by long distances; the plan area is no exception. Most settlement in the plan area occurs in close proximity to the town of Atlin. The nearest major center, Whitehorse in the Yukon, is approximately 200 km (two hours drive) away. The township of Atlin is unincorporated and there is no municipal government in the town, i.e., there is no elected body such as Mayor or town council and no by-laws. The plan area is not within a Regional District. It is included in what is called the Stikine District.

The Land Status and Licenses map depicts private land, Indian reserves, tenures, map reserves and other licenses, specifically water license points of diversion.

> Uses in Planning: Provides the current status of land for consideration in planning processes.

Ownership

Approximately 1 505 ha of the plan area is private land. Atlin township is unincorporated and the affairs of the town are run by voluntary organizations such as the Atlin Advisory Planning Commission, who deal with land use planning and application referrals, and the Atlin Board of Trade. There are also some small federally owned lots within the townsite.

Indian Reserves

There are 8 Taku River Tlingit Indian reserves totaling approximately 1 194 ha in the plan area. Most of the reserves are around Atlin. Most homes are on the Five Mile Point Indian Reserve No. 3 about 8 km south of Atlin. A small number of households and the TRTFN administration office are located on Indian Reserve No. 4 ('townsite reserve') within Atlin.

Tenures

There are a variety of tenures established under the Land Act within the plan area. The allocation and administration of Crown land plays a pivotal role in expanding and diversifying the economy. Over twenty sectors of the economy depend upon continued use of Crown land. Tenures are created for broad purposes such as commercial, communication and transportation uses among others. The majority of these are in the Atlin community area. These broad purposes are broken down in the government records into more detailed sub-purposes. For recreation related tenures please see the Recreation and Tourism map.

Agricultural Tenures

Tenures for the purpose of commercial agricultural production is limited to one extensive (68 ha) and one intensive (15 ha) agricultural tenure in the plan area. Extensive agriculture refers to crown land that is available to cultivate commercial crops for mechanical harvesting. Intensive agriculture means the use of Crown land parcels of an area of 15 ha or less for the commercial production of animals, fruits and/or vegetables. Examples of intensive agriculture include poultry farms, dairy farms, market gardens, greenhouses, nurseries, piggeries and feed lots.

> Uses in Planning: Identify locations of agriculture tenures and potential resource conflicts; assessment of the implications of land use decisions on agricultural activities

Range Tenures

There are six crown range tenures in the plan area. These crown range tenures are closely linked to guide-outfitting within the plan area. Extensive tenures exist for horses used by outfitters. Several guide-outfitting businesses have also established horse raising and wintering businesses in the Atlin area (D. Russell, pers. comm.)

> Uses in Planning: Identify locations of grazing licenses and leases and potential resource conflicts; assessment of the implications of land use decisions on agricultural activities

Environment and Conservation Map Reserves

There areas are established for the Ministry of Environment under Section 17 of the Land Act. Map Reserves designate a portion of Crown land for a particular use, in this case, for the conservation of natural resources. The designated Crown land is withdrawn from disposition under the Land Act for any purpose that is not compatible with the conservation purpose for which the land has been designated.

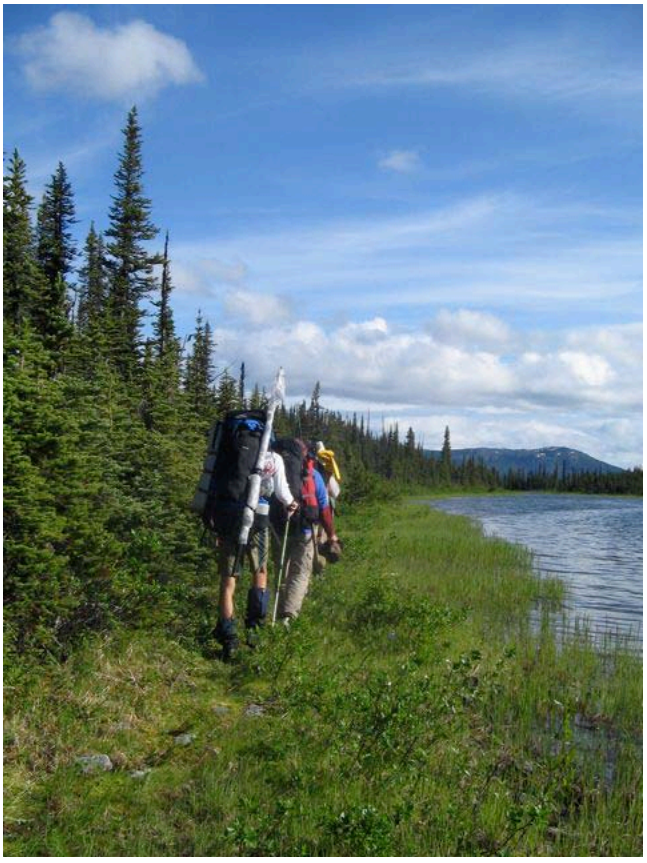
> Uses in Planning: Provides the current status of land for consideration in planning processes.

Water Licenses - Points of Diversion

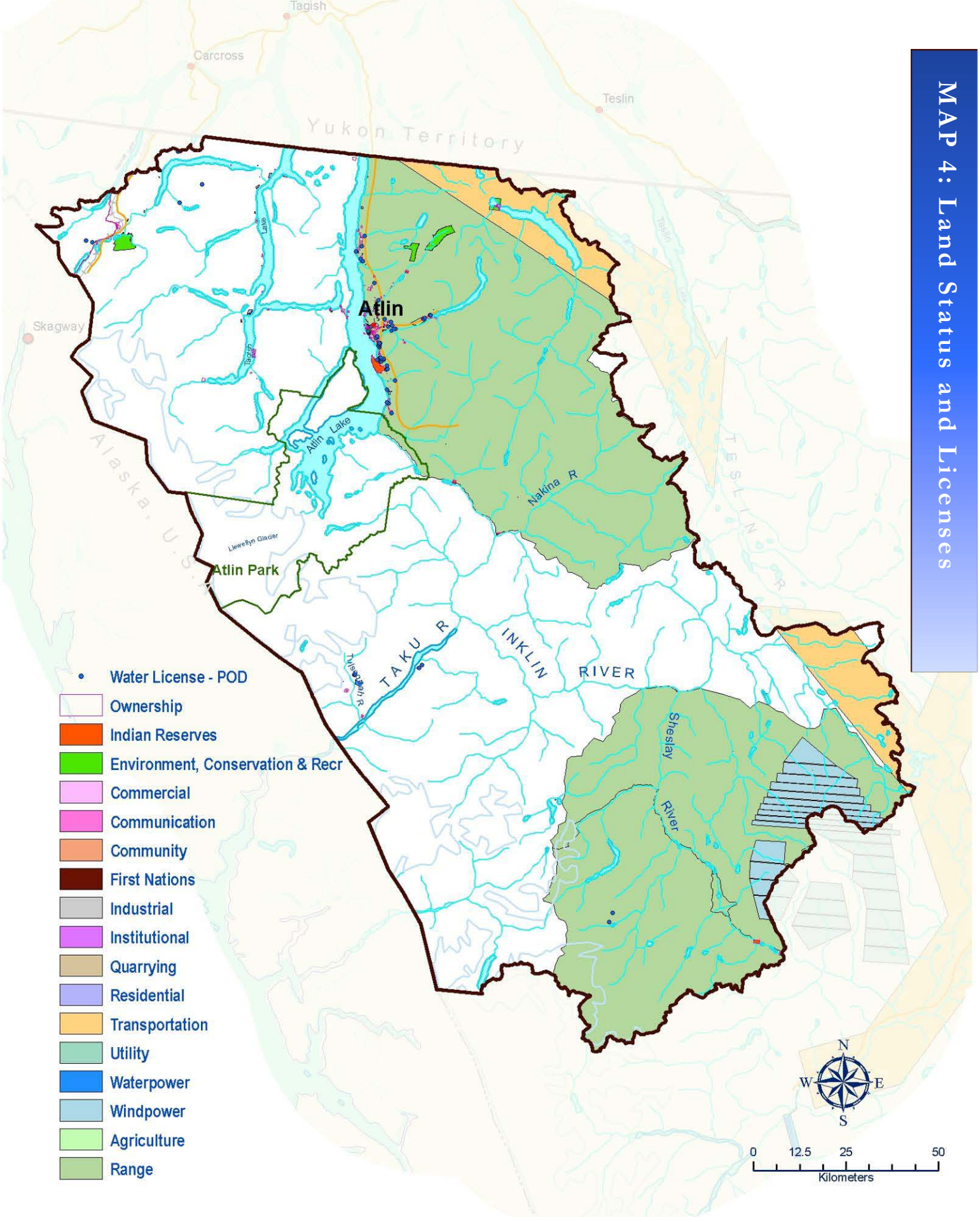
Water licenses can be held for a number of purposes for the diversion of water. Within the plan area, water diversion purposes include domestic water use, works camps, irrigation, fire protection, mining, and other purposes.

> Uses in Planning: Identify locations of water diversion point sources and potential resource conflicts; assessment of the implications of land use decisions on water use

Hiking on the taku River Tlingit traditional trail to the Nakina River.



MAP 4: Land Status and Licenses



MAP 5: GUIDE OUTFITTER AND TRAPPING TERRITORIES

Guide Outfitter Territories

Hunting is a significant recreational, sustenance and commercial activity in the planning area. While many of the hunters in the planning area are residents of BC, guide outfitters cater to destination tourists wanting to hunt big game. Five wildlife management units (MUs) fit within, and share the boundaries of the plan area: 6-25, 6-26, 6-27, 6-28 and 6-29. Moose and black bear are the most widely hunted big game species. Guides also lead hunts for grizzly bear, mountain goat, caribou, Stone's sheep and Dall's sheep within the planning area.

Nine guide-outfitting territories overlap the Atlin-Taku planning area boundary. Although none of these are contained wholly within the plan area, various proportions of each are located within the boundary.

> Uses in Planning: Identify locations of guide outfitting territories and potential resource conflicts; assessment of the implications of land use decisions on guide outfitting territories.

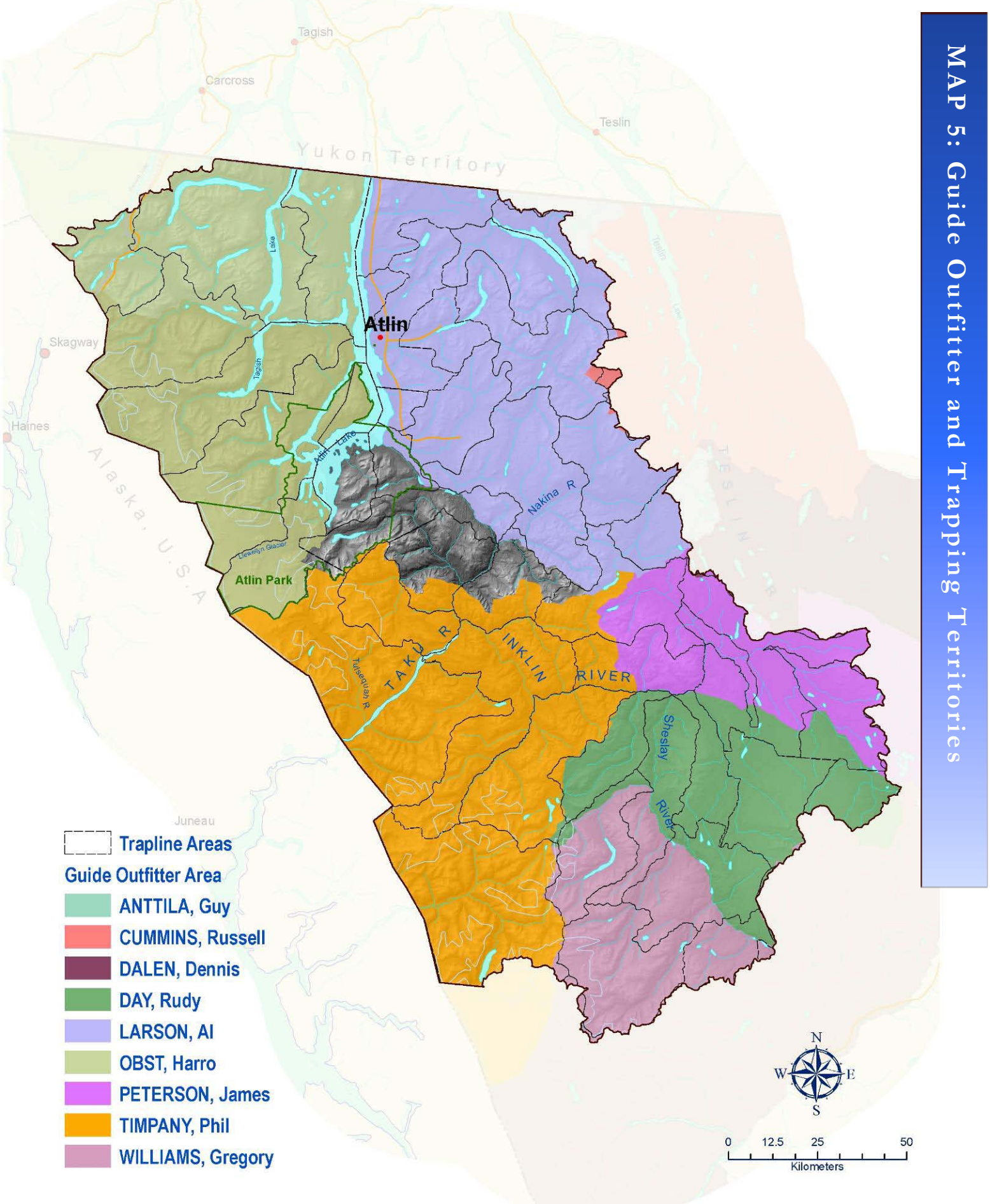
Trapping Territories

Significant portions of 44 trapping territories overlap the Atlin-Taku plan area. The number of trappers is unknown because many lines may be inactive and each trapping territory can have several registered trappers who may be actively trapping. In addition, any number of assistant trappers who have permission from the registered trap line holders may be trapping on a given trap line. Trapping within the Atlin-Taku plan area has been a traditional activity for First Nations and has important cultural significance.

Marten has historically been the most heavily trapped species. Approximately twice as many marten are caught annually compared with the next most trapped species, the squirrel (Table 16). Although figures vary significantly from year to year, trapping of martin, lynx, weasel and mink appear to have declined over the past decade. Squirrel trapping remained relatively stable until 1998 when numbers shot up significantly. Beaver is the only commonly trapped species to have seen an increase in trapping through the 1990s. Other species trapped within the planning area include coyote, fisher, fox, muskrat, river otter, wolf and wolverine.

> Uses in Planning: Identify locations of trapping territories and potential resource conflicts; assessment of the implications of land use decisions on trapping territories.

MAP 5: Guide Outfitter and Trapping Territories

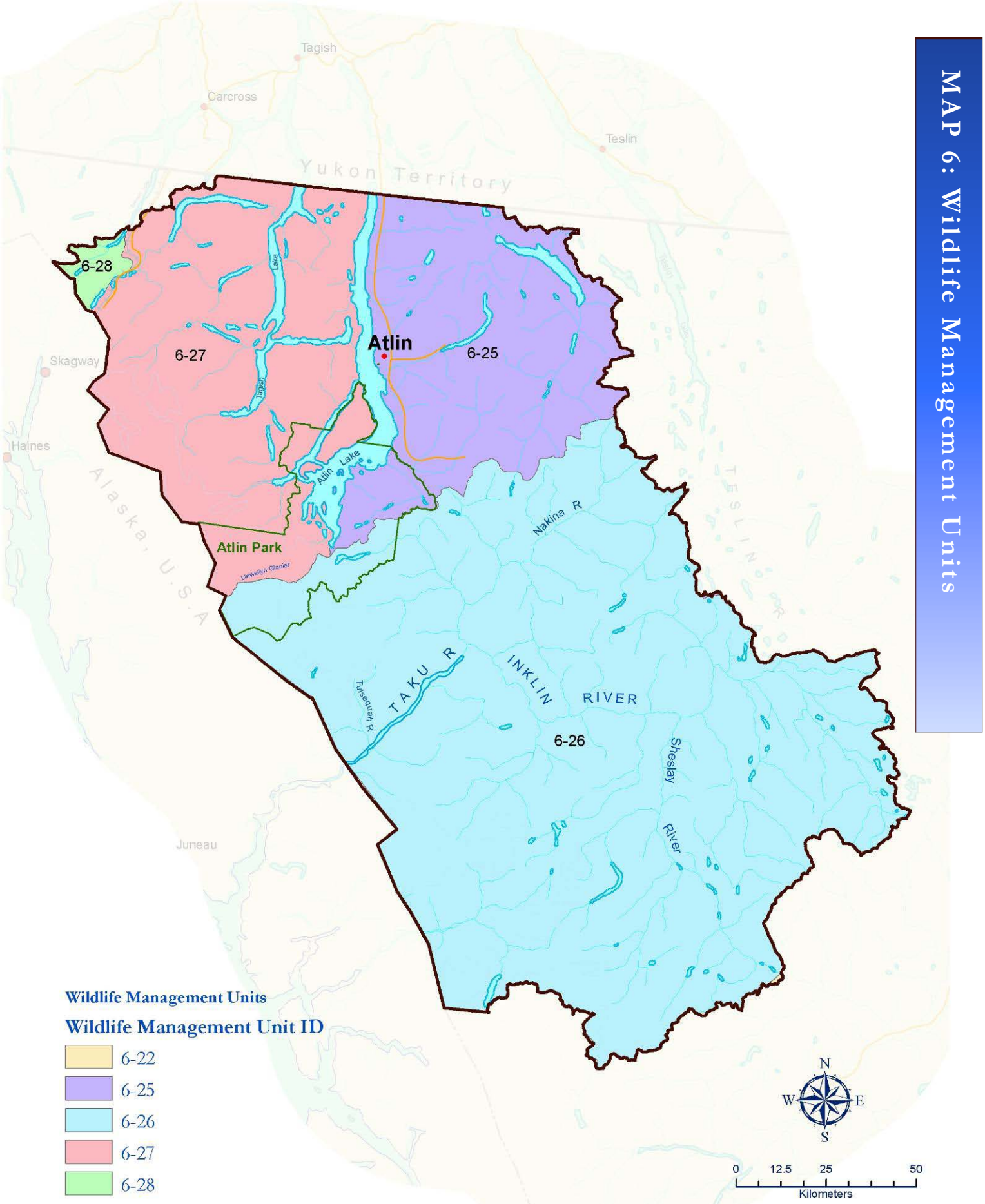


MAP 6: WILDLIFE MANAGEMENT UNITS

Regulations for Hunting and Fishing are established by the Ministry of Environment by Wildlife Management Unit (WMU). The Province is divided into 225 management units. Three WMUs cover the majority of the planning area 6-25, 6-26, 6-27. Unit 6-28 covers a small portion in the northwest corner of the planning area.

> Uses in Planning: Used in Collaborative Fish and Wildlife Management Planning as planning units for management directions.

MAP 6: Wildlife Management Units



MAP 7: RECREATION AND TOURISM

With its spectacular scenery, rich cultural history, and diversity of landforms, the Atlin-Taku area has an abundance of opportunities for high value recreation and tourism for local residents and for people from throughout BC and around the world. The rich culture of the local First Nations and a vibrant pioneer history add to the character and appeal of the area. The remoteness of the area adds to this appeal.

Many visitors to Atlin detour into the town on their way to or from Alaska. Most tourism activity occurs in the summer months (from May to September). There is a strong nature-based emphasis on tourism activities in this area, including in the 40 000 ha Atlin Recreation Area and adjacent Atlin Provincial Park. Most of the tourism occurring outside of Atlin could be classified as backcountry. Atlin has a number of facilities to cater to front country clientele including accommodations (a hotel, motels, bed and breakfasts, lodges and cabins, and RV and camping facilities), dining facilities, and a range of tourism attractions.

Motorized recreational activities primarily occur out of Atlin, Whitehorse, and Teslin and include hunting and general exploring of the backcountry using snowmobiles and all-terrain vehicles (ATVs). Off-road vehicles generally use old mining exploration roads and also access the area's open alpine plateaus.

In summer the large lakes in the plan area, including Atlin, Tagish, and Teslin Lakes, provide a plethora of recreational opportunities. This includes fishing for lake trout, dolly varden, arctic grayling and pike, as well as sailing, kayaking, canoeing, and motor boating among the areas' numerous islands and bays. The Taku and other rivers offer opportunities for remote whitewater kayaking, canoeing and rafting. Heli-skiing also occurs within the plan area. Other winter tourism activities include snowmobiling, cross-country skiing, and dog-sledding.

Commercial Recreation Tenures and Permits

Most commercial recreation activity occurs in the lower Taku River and involves guided fishing for salmon, including steelhead. Guided fishing trips are staged out of Juneau and Atlin. A small number of companies also offer multi-day rafting and whitewater kayaking trips from the Sheslay River, down the Inklin and then the Taku to Juneau. Rafting and kayaking trips are generally staged out of Juneau. Heli-skiing is available based out of Atlin.

Commercial permits are in place for guided hikes, mountaineering canoe and kayak trips, houseboat tours, snowmobile and cross-country tours, angling trips, day boat tours and sightseeing flights in Atlin Park, staged out of Atlin. Local airplane and helicopter operators offer scenic flights of the area as well as opportunities for heli-hiking and heli-fishing. Guided big game hunting, fishing, and wildlife viewing opportunities are also available (see Guide Outfitters). For those opting to go without a guide, houseboat and motor boat rentals are available in Atlin for travel on Atlin Lake.

Commercial recreation tenures that have specific tenure boundaries are shown on the included map. Permits are not shown as they do not apply to a specific location.

Uses in Planning: Identifies possible areas for resource conflict

Recreation Sites and Trails

Atlin Park, at the south end of Atlin Lake, is primarily a boating location for tourists. Most of the access to the area is by boat and people visit in kayaks, motor boats, and houseboats, anchoring among the bays and many islands in the park. One trail in the park leads to Llewelynn Glacier from Llewelynn Inlet.

The BC Ministry of Tourism, Sports and the Arts maintains seven recreation sites, six of which are around Atlin. In addition to Monarch Mountain, some of the more popular hiking trails in the Atlin area include Atlin Mountain and Ruby Mountain, which is an extinct volcano. Recreationists can hike portions of the historic Yukon Telegraph Trail, which runs from Telegraph Creek to Atlin. The trail is not maintained and there are no bridges or established stopover areas. Guide outfitters currently use portions of the trail for guided hunting.

Only a portion of these recreation resources have been captured and mapped; additional areas may be mapped during the land use planning process.

Uses in Planning: Identifies possible areas for resource conflict

Use, Recreation for Enjoyment of the Public (UREP)

In order to prevent unwarranted alienation or disposition of Crown land that had been recognized as possessing significant recreational potential, in the 1960's – 1980's the Ministry of Environment requested that many small parcels of land through-out the province be established as UREPs under the Land Act. These UREP's are areas now where the Ministry of Environment has a recorded interest, but no administrative and management authority. The intention was to register the public's interests in the areas and maintain the lands from disposition under the Land Act for any purpose that was not compatible with the purpose for which the land was designated, which generally was recreational access and enjoyment for the public, although some were established for fish and wildlife purposes. The process under which these designations were established ended in the 1980's. These UREP designations will be reviewed and evaluated during this planning process and may be eliminated unless recognized formally within the plan.

Uses in Planning: Identifies areas for consideration in development of land use zonation.

Atlin Recreation Area

A recreation area is defined as Crown land reserved or set aside for public recreational use and is legally established by order in council, and is under the direct jurisdiction of the Ministry of Environment; the Park Act applies. However, a recreation area differs from a typical park in that the minister has greater discretion in issuing park use permits, and mineral exploration may be permitted to occur if the recreation area is also designated as a recreation area under the Mineral Tenure Act. However, the Atlin Recreation area is under a temporary no-staking reserve until completion of the land use plan, where the exact status of the area will be evaluated.

The recreation area designation has evolved over time. In the past, prior to consideration for designation as Class A parks, lands had to be open for a minimum interim period of ten years to permit mineral resource evaluation. During this time, primacy was given to conservation and recreation values as no other industrial activities were permitted. With the introduction of the Protected Areas Strategy and strategic land use planning processes, all recreation areas are being

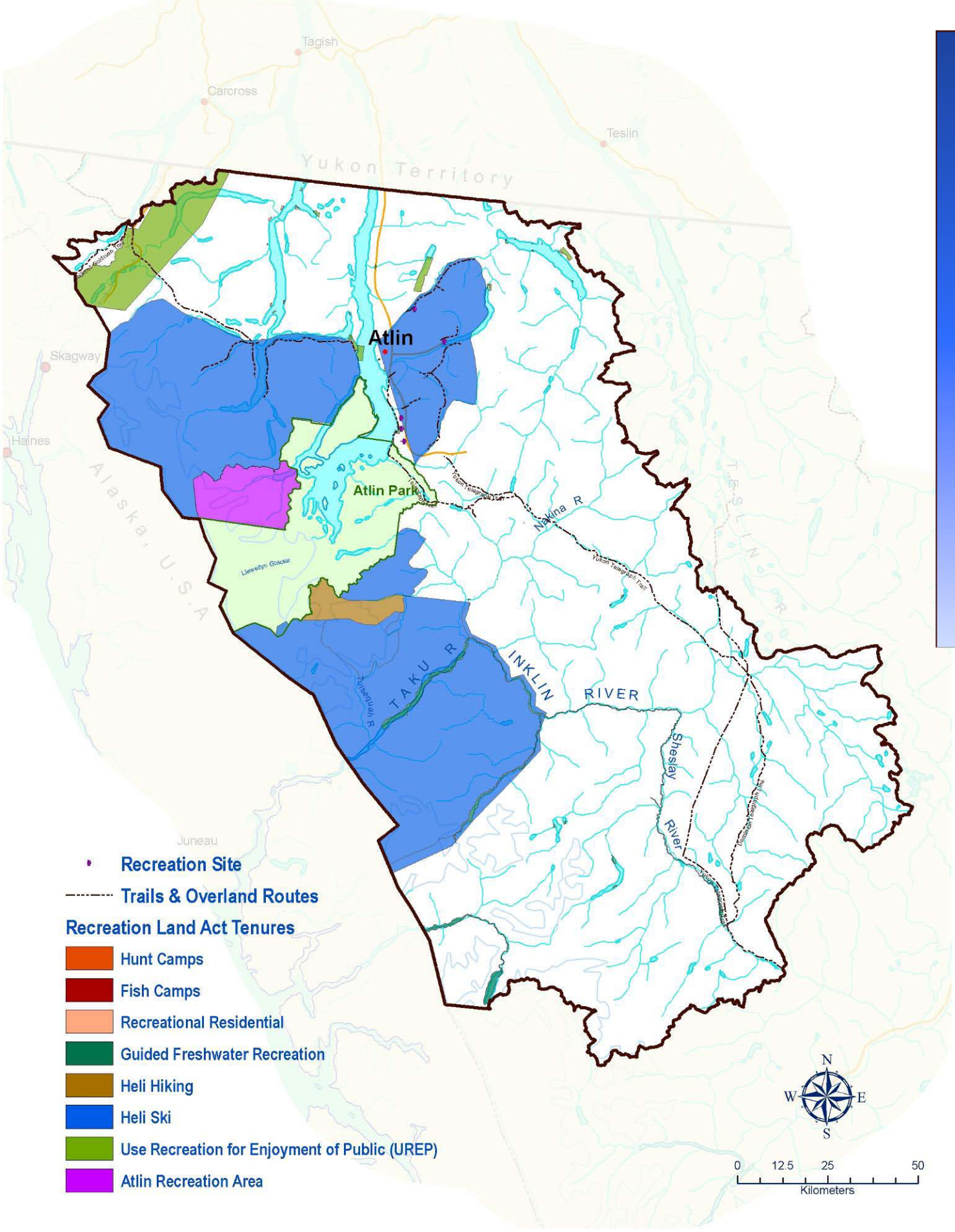
evaluated from both a protected area value and an economic opportunity perspective to determine whether the area should be "upgraded" to full protected area status (e.g. Class A park) or returned to integrated resource management lands.

Current management direction for the Atlin Recreation Area was established in 2000 under the approved Atlin Provincial Park and Recreation Area Management Direction Statement (http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/atlin/atlin.html).

> Uses in Planning: Identifies areas for consideration in development of protected areas and land use zonation.

Now the Atlin headquarters for the Glaciological and Arctic Sciences Institute, operated by the University of Idaho, this building was once was once a wing of the former Atlin Inn, and was once also used as a hospital.
- Atlin Historical Society

MAP 7: Recreation and Tourism



MAP 8: TRADITIONAL TERRITORIES

First Nations Statement of Intents (SOIs) and Traditional Territories

There are four First Nations groups with mapped interests that overlap the land use plan area: the Taku River Tlingit First Nation, Tlingit Teslin Council, Carcross/Tagish First Nation, and the Tahltan First Nation. With the exception of the Tahltan First Nation, the traditional territories of these First Nations are transboundary, extending from BC into the Yukon and, in some cases, into Alaska.

Statements of Intent are documents prepared by First Nations participating in the BC Treaty Process and include maps showing traditional territories of the First Nations.

The traditional territory of the Taku River Tlingit includes the Taku River and most of its tributaries, Atlin and Little Atlin lakes at the southern end of the Yukon drainage, and large portions of the interior region in the southern Yukon.

The Teslin Tlingit live in and around the town of Teslin in the Yukon Territory, 183 km from Whitehorse. The traditional territory of the Teslin Tlingit includes the drainage system of Teslin Lake in northern BC and the southern Yukon.

The Carcross/Tagish First Nation are people of Tlingit, Tagish and Athapaskan descent and most live in the community of Carcross and Tagish. The traditional territory of the Carcross/Tagish people is primarily located at the headwaters of the Yukon River system in the Yukon and northwestern BC.

The Tahltan have traditional territories in the Taku River watershed and still make extensive use of portions of the watershed. The Tahltan communities are located in the neighbouring Cassiar Iskut-Stikine area, in the towns of Dease Lake, Telegraph Creek, and Iskut. The Tahltan traditional territory includes the entire Stikine River watershed.

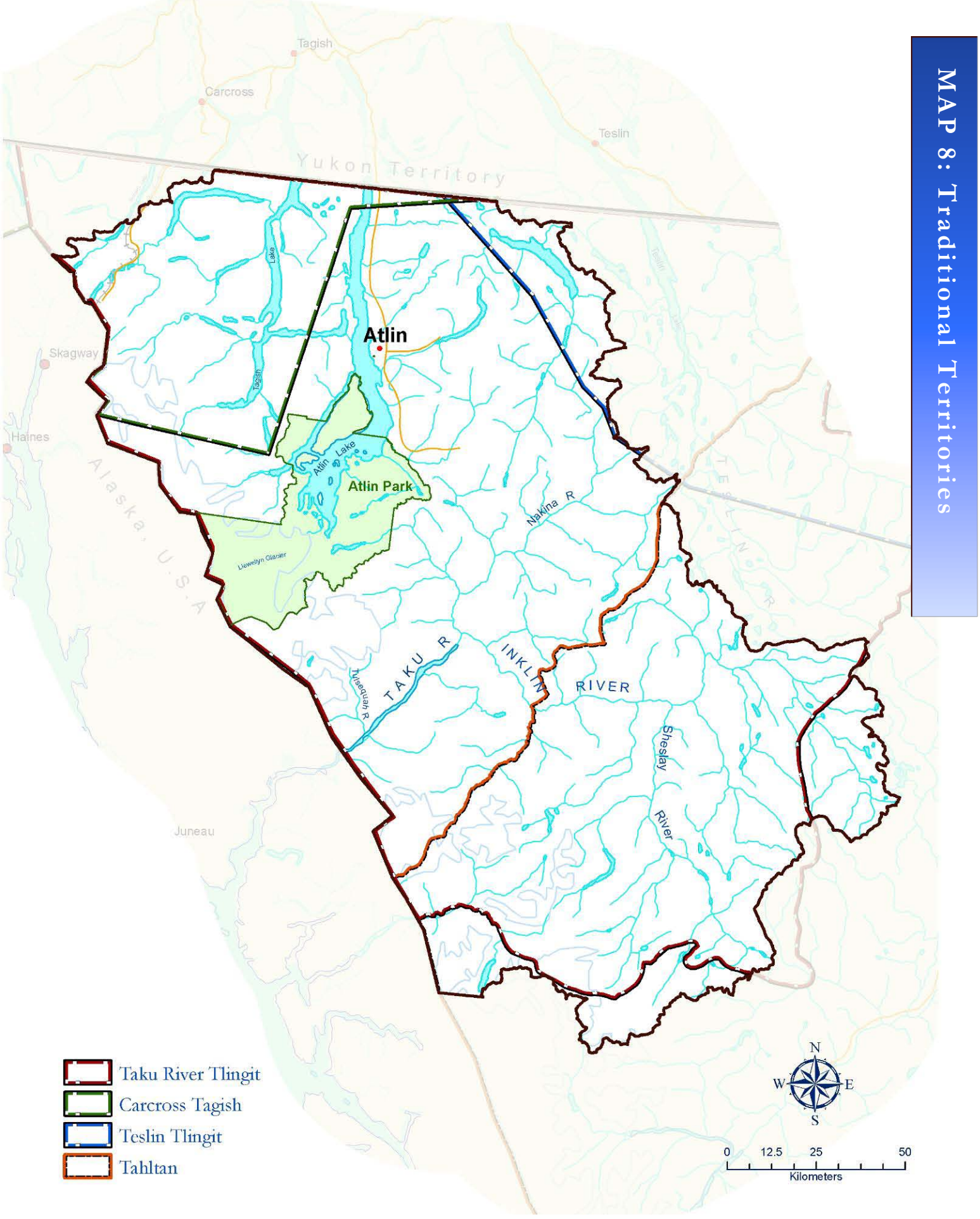
> Uses in Planning: Identifies areas of interest to First Nations within the plan area

Archaeological Sites

There are 206 listed archaeological sites in the Provincial Archaeological Site Inventory within the planning area. Some of these sites have been entered into the system as recent as 2006. Due to the confidential nature of this data, a map is not included in the atlas. However, copies may be available for viewing as required during the planning process.

> Uses in Planning: Identifies some archaeological areas of interest to First Nations within the plan area

MAP 8: Traditional Territories



ECOLOGICAL CLASSIFICATION SERIES

Two of the most common methods for describing the ecosystems of British Columbia are the Biogeoclimatic Ecosystem Classification (BEC) system and the Ecoregion Classification system. The BEC system and Ecoregion Classification system are compatible and are often integrated for land use planning purposes. The main difference between the two is that an ecoregion is a distinct geographic area of the province, whereas a given biogeoclimatic zone occurs in areas of similar climate, vegetation, and soils throughout the province, and may be found within several ecoregions.

Uses in Planning:

- to determine what ecosystems and ecosections are represented in an area and the resource values (e.g., wildlife habitat) that exist within them. What does this imply for the type of wildlife use and other ecological values?
- to determine what ecosystems and ecoregions are under-represented in the existing protected area system
- to determine which areas should be considered for protection or area-specific management to maintain biodiversity
- to determine which landscape units should have high, medium and low biodiversity options.
- to determine the function and distribution of plant communities in a landscape; to derive interpretive maps of habitat suitability and capability for wildlife.

MAP 9: BIOGEOCLIMATIC ECOSYSTEM CLASSIFICATION (BEC)

The BEC system delineates areas into biogeoclimatic zones according to climate, vegetation, and landforms similarities. The Atlin-Taku land use plan area contains eight biogeoclimatic zones. Two of these are related to non-forested alpine areas, Boreal Altai Fescue Alpine (BAFA) and Coastal Mountain-heather Alpine (CMA). The remaining six zones are: Boreal White and Black Spruce (BWBS), Coastal Western Hemlock (CWH), Engelmann Spruce-Subalpine Fir (ESSF), Mountain Hemlock (MH), Sub-Boreal Spruce (SBS), and Spruce-Willow-Birch (SWB) (two variants - mk and un).

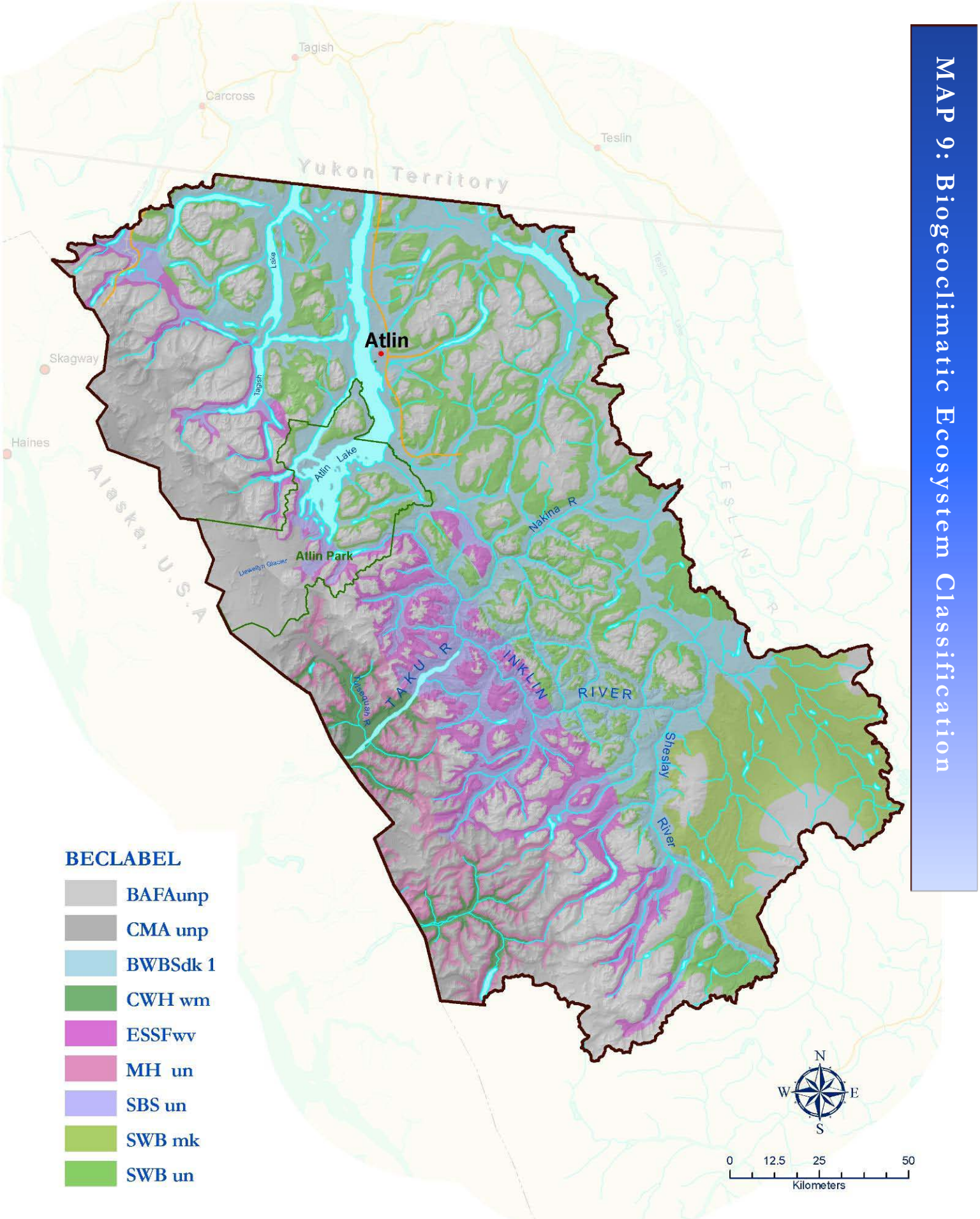
BEC	Area	Percent
BAFA unp	741 085	24
CMA unp	322 346	10
BWBS dk 1	679 981	22
CWH wm	61 989	2
ESSF wv	210 994	7
MH un	123 217	4
SBS un	181 423	6
SWB mk	252 119	8
SWB un	467 739	15

There are three main categories with biogeoclimatic ecosystem classification:

- **zone:** an area that shares the same dominant climax tree species and regional climate
- **sub-zone:** an area within a zone that shares climax vegetation cover and sub-regional climate
- **variant:** a further division that delineates areas within sub-zones that vary slightly by climate (e.g. drier, wetter, warmer, or cooler areas)

There is only one polygon with a variant within the plan area, the remaining are only broken down into zone and sub-zone. For example, ESSF wv refers to the Engelmann Spruce – Subalpine Fir zone and the wet and very cold sub-zone.

MAP 9: Biogeoclimatic Ecosystem Classification



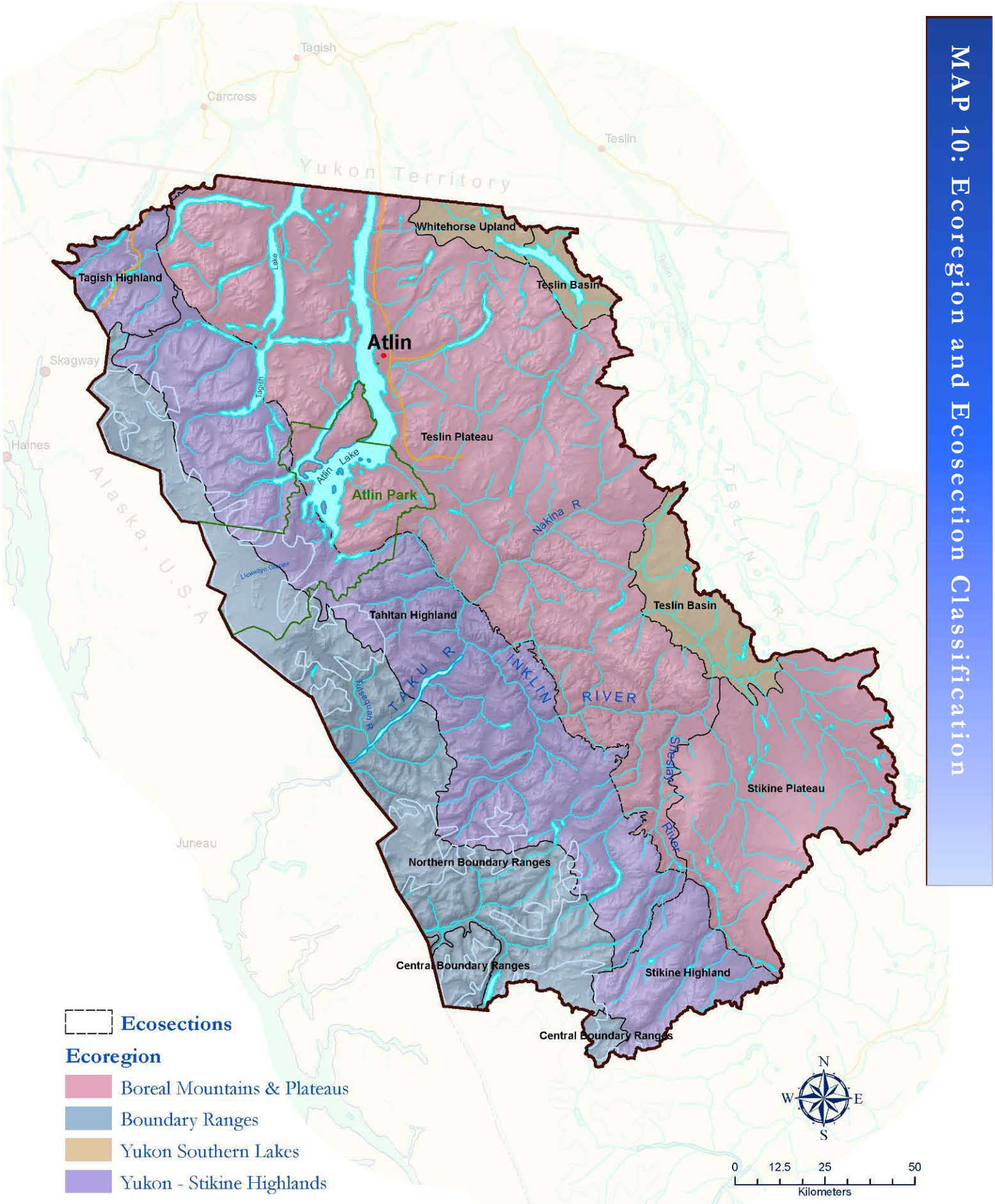
MAP 10: ECOREGION AND ECOSECTION CLASSIFICATION

A broader method of describing ecosystems is the ecoregion classification system. The ecoregion classification system is a hierarchical system dividing the province into discrete geographical units at five different scales. The five levels from largest to smallest are as follows: ecodomains, ecodivisions, ecoprovinces, ecoregions and ecosections. Ecodomains and ecodivisions are very broad (e.g. four ecodomains are found in BC) and place the province in a global context based on broad climatic processes and landforms (e.g. mountain ranges and plateaus). The remaining three levels place the province in context with the rest of the continent or relate areas within the province to each other. These lower levels divide the province based on areas of similar climate, physical landscapes and wildlife potential.

Ecoregions are of most use in landscape level planning such as that being undertaken in Atlin Taku. An ecoregion is an area with major physiographic differences and minor macroclimatic variation.

Ecoregion	Area	Percent
Boreal Mountains and Plateaus	1 557 459	51
Boundary Ranges	507 914	17
Yukon Southern Lakes	161 218	5
Yukon – Stikine Highlands	811 339	27

MAP 10: Ecoregion and Ecosection Classification



MAP 11: SENSITIVE ECOSYSTEMS AND KARST RESOURCES

Sensitive Ecosystems[1]

The Integrated Land Management Bureau (ILMB) of the British Columbia Ministry of Agriculture and Lands, and the Taku River Tlingit First Nation (TRTFN) are embarking on a joint land use planning initiative in the Atlin-Taku region of northwest British Columbia. This sensitive ecosystem inventory was undertaken to provide information on sensitive ecosystems for the planning process. The inventory followed the Standard for Mapping Ecosystems at Risk in British Columbia (RISC 2006), at a reconnaissance level (1:250,000 scale). The Atlin-Taku planning area covers more than 3 million hectares, and includes portions of the Atlin, Gladys, Tagish, Taku and Whiting watersheds within northwest British Columbia.

The objectives of this report are to:

1) Conduct a reconnaissance level inventory of terrestrial sensitive ecosystems in the Atlin-Taku planning area.
2) Provide an overview of the threats to these sensitive ecosystems.
3) Map the location of the inventoried sensitive ecosystems.

A biophysical approach was used for this project, as this method identifies locations with atypical environmental characteristics. These atypical sites will be enduring on the landscape and will continue to harbour regionally unusual biota and processes regardless of climate or environmental change. Water features were not the focus of the report, though some that were identified by contacted individuals are listed in the report.

Sensitive ecosystems covered 66,700 ha or 2.2% of the Atlin-Taku study area. Sensitive ecosystem types were very diverse, ranging from those depending on hydrological processes such as flooding, those depending on geological processes such as landslides, to those depending on bedrock geology such as limestone canyons, calcareous wetlands, ultramafic bedrock influenced plant communities, and hydromagnesite and tufa deposits.

At 31,000 ha, sensitive riparian ecosystems covered the largest area of the sensitive ecosystem classes. Floodplains comprised most of the sensitive riparian area. Most of the sensitive floodplain was located along the lower Taku River, with significant amounts on the Inklin and Sheslay rivers.

The Grasslands–Shrub/Steppe ecosystem was the second most abundant sensitive ecosystem, covering 10,700 ha. The majority of this was in the Fourth of July Creek–Coronation Creek area on extensive glaciofluvial deposits. Other areas of Grassland–Shrub/Steppe were located along the Sheslay and Nahlin rivers on steep south-facing slopes.

Canyons in limestone bedrock along the Nakina River and Houdini Creek covered 8,600 ha. These areas are important for their diversity of plant communities, unusual plant communities, limestone features and unusual hydrological processes.

[1] Executive summary from: DeGroot, A. and J. Pojar. 2009. Sensitive Ecosystems of the Atlin-Taku Planning Area. Prepared for the Bulkley Calley Centre for Natural REsrouces Research and Management.

The Lichen Landscape in White Pass covered 6,100 ha. This area is unique because the complex microtopography, consisting of glacially scoured bedrock, glaciofluvial deposits, ponds, lakes and wetlands, has extraordinarily high lichen diversity.

Sensitive wetlands occupied 4,300 ha, with a large wetland complex on the Heart Range making up the majority of this. Six calcareous wetlands form the remainder of the sensitive wetland area.

Pine-Lichen woodlands covered 4,000 ha, mostly near Steamboat Mountain and Indian Lake; additional ecosystems of this type are likely to occur in the study area.

Karst Resources

This project was a regional evaluation of the Atlin-Taku Planning Area (ATPA) to determine whether karst landscapes and karst features were present in established reconnaissance-level karst potential units, and to provide karst vulnerability potential mapping for the areas examined.

The Integrated Land Management Bureau (ILMB) in Smithers contracted Cave Management Services/KarstCare™ to provide information on karst resources in support of a joint land use planning initiative between ILMB and the Taku River Tlingit First Nation. During preparation of the land-use plan, it was noted that insufficient information existed for karst resources at a scale appropriate for planning. The office and field components of this project were intended to provide the necessary neutral and science-based data to fill this gap.

It was understood that a full-scale detailed planning level karst inventory (as outlined in the RISC, 2003) of the entire ATPA could not be carried out within the timeframe or budget. It was therefore decided that the project would delineate karst units using a modified regional planning level karst inventory approach, and that selected karst units would be chosen for the more detailed evaluations.

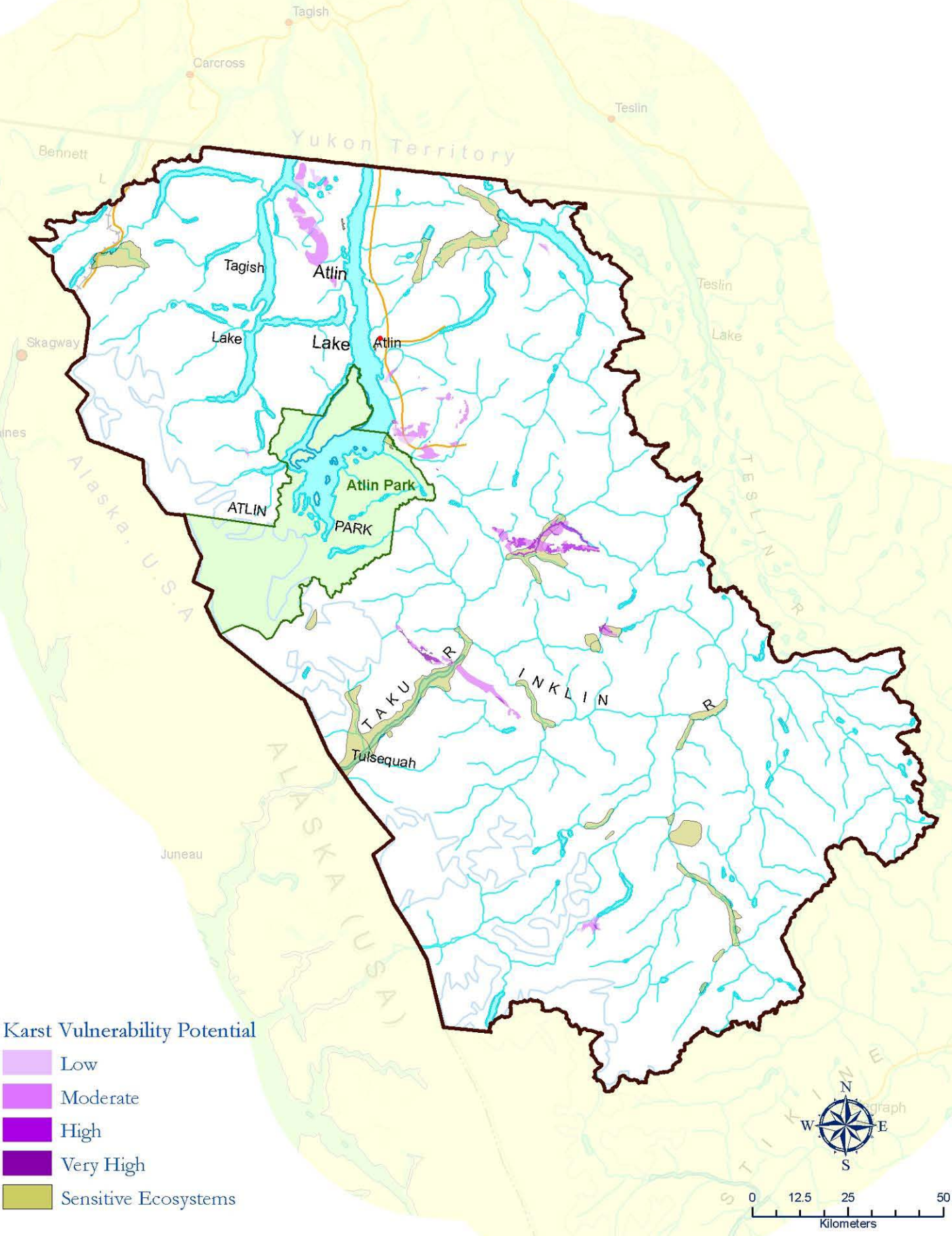
The fieldwork was conducted by Paul Griffiths and Carol Ramsey. Twenty person-days were spent examining karst in the planning area from August 5 to August 16, 2008 inclusive.

Key deliverables for the project consisted of:
1) An updated karst potential map for the planning area, including boundary refinement where necessary
2) The classification and location of both verified and suspected karst features

Limitations:
The preliminary information, mainly at a planning level, can be used to assist further land use planning and to guide future more detailed karst inventories and development activities.

Further field checking at a more detailed level is recommended if major land use activities are planned in specific areas in the future, to reduce the potential for adverse impacts to karst resources. More complete detailed karst vulnerability potential mapping is recommended in areas not overflown or ground-truthed and where conflicting land use activities may be planned.

MAP 11: Sensitive Ecosystems and Karst Resources



MAP 12: WATERSHEDS

Significant Watersheds

The BC Watershed Atlas divides the Province into geographic areas called Watershed Groups. Approximately 250 Watershed Groups are required to provide complete coverage of the Province of British Columbia. Watershed Groups are based upon natural watershed boundaries and are suitable for planning at a regional scale. There are 10 Watershed Groups in the land use agreement area. Of these, three are only partially within the agreement area, Kusawa River, Teslin River and Barrington River. The most northern five watershed groups drain to the Yukon River while those south of Atlin Lake drain to the Taku River or Pacific Ocean.

Watershed Group	Drainage
Kusawa River	Yukon River
Tutshi River	Yukon River
Atlin Lake	Yukon River
Teslin River	Yukon River
Gladys River	Yukon River
Nakina River	Taku River
Inklin River	Taku River
Nahlin River	Taku River
Sheslay River	Taku River
Barrington River (Whiting River)	Taku River

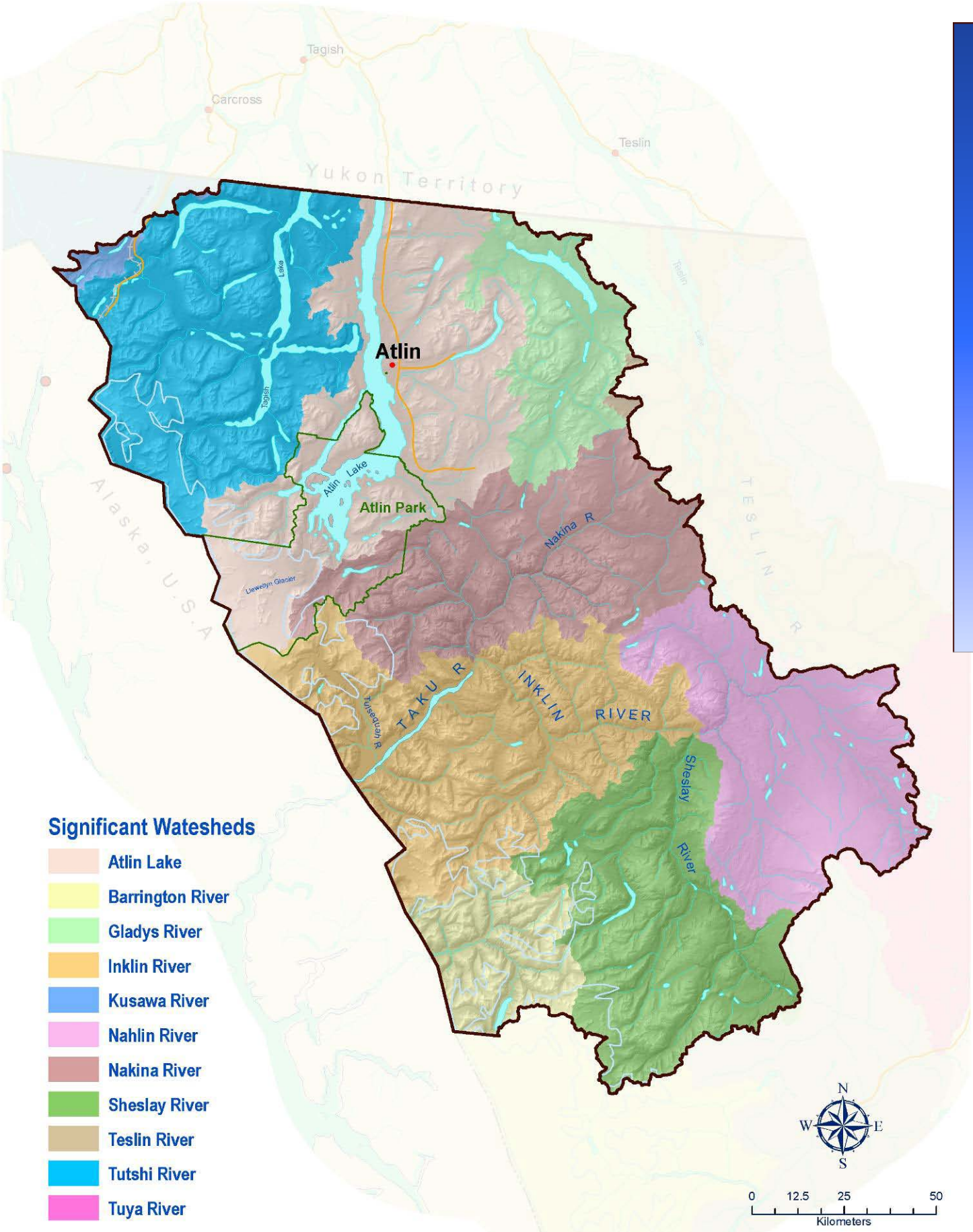
Uses in Planning: Potential planning units suitable for planning at regional scale.

3rd Order Watersheds

Each Watershed Group can be subdivided into lower-order watersheds that are nested within the Watershed groups based on stream orders contained within the watershed. Third order watersheds are appropriate units for more detailed level planning. The typical Watershed Group may be comprised of 50 or more third order watersheds. There are more than 35 000 third order watersheds in the Province and a total of 518 within the land use agreement area.

Uses in Planning: Potential planning units suitable for planning at a detailed local scale.

MAP 12: Significant Watersheds



MAP 13: FOREST RESOURCES

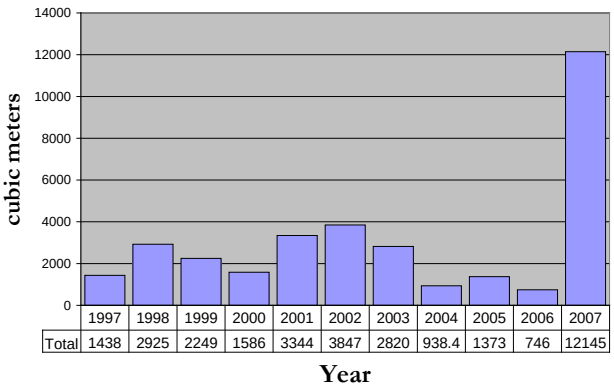
The Atlin Taku plan area is covered by the Atlin supply block of the Cassiar Timber Supply Area (TSA). The Cassiar TSA covers over 14.8 million hectares in total and has an Allowable Annual Cut (AAC) of 400 000 m^3/yr, effective January 1, 2002.

Overall, there is little harvesting activity in the Cassiar TSA. Approximately 75% of the area is tundra, rock and alpine; only 25% of the area is forested. Of the productive forest, about 200 000 ha, or 1.3 percent of the TSA land base, is available for harvesting under 2002 management considerations and objectives. Areas of merchantable timber are often difficult to access due to their remoteness and the high cost and difficulties of building roads into areas.

The Atlin supply block has a partition of 32 000 m^3/yr representing 8% of the AAC for the Cassiar TSA. All of the existing timber harvesting is around the Atlin area and consists of small-scale harvesting under Free Use Permits for firewood cutting up to 10 cords or 50 m^3 and for mineral exploration (i.e. for mine timbers and removal of immature timber to allow room for expansion of mining operations). It has also been comprised of Forestry Licenses to Cut (primarily for log building) and Occupant Licenses to Cut (mineral exploration related to roads).

Forestry License to Cut are issued for 50 – 500m^3 and must be undertaken in a patchwork design of openings < 1 ha in size. Volume averages approximately 190 m^3/ha. Harvesting occurs during the snow free season from late spring to early fall as roads permit.

The average harvest level over the past 10 years has been 2 000 to 3 000 m^3 (or 10 to 15 ha) as shown in the chart. Of the 2007 total, 11 205 m^3 is related to the work taking place on the Lower Taku River by Redfern Resources Ltd. The current level of harvesting is unlikely to change (C. Rygaard, pers comm.).



Forest Administrative Areas

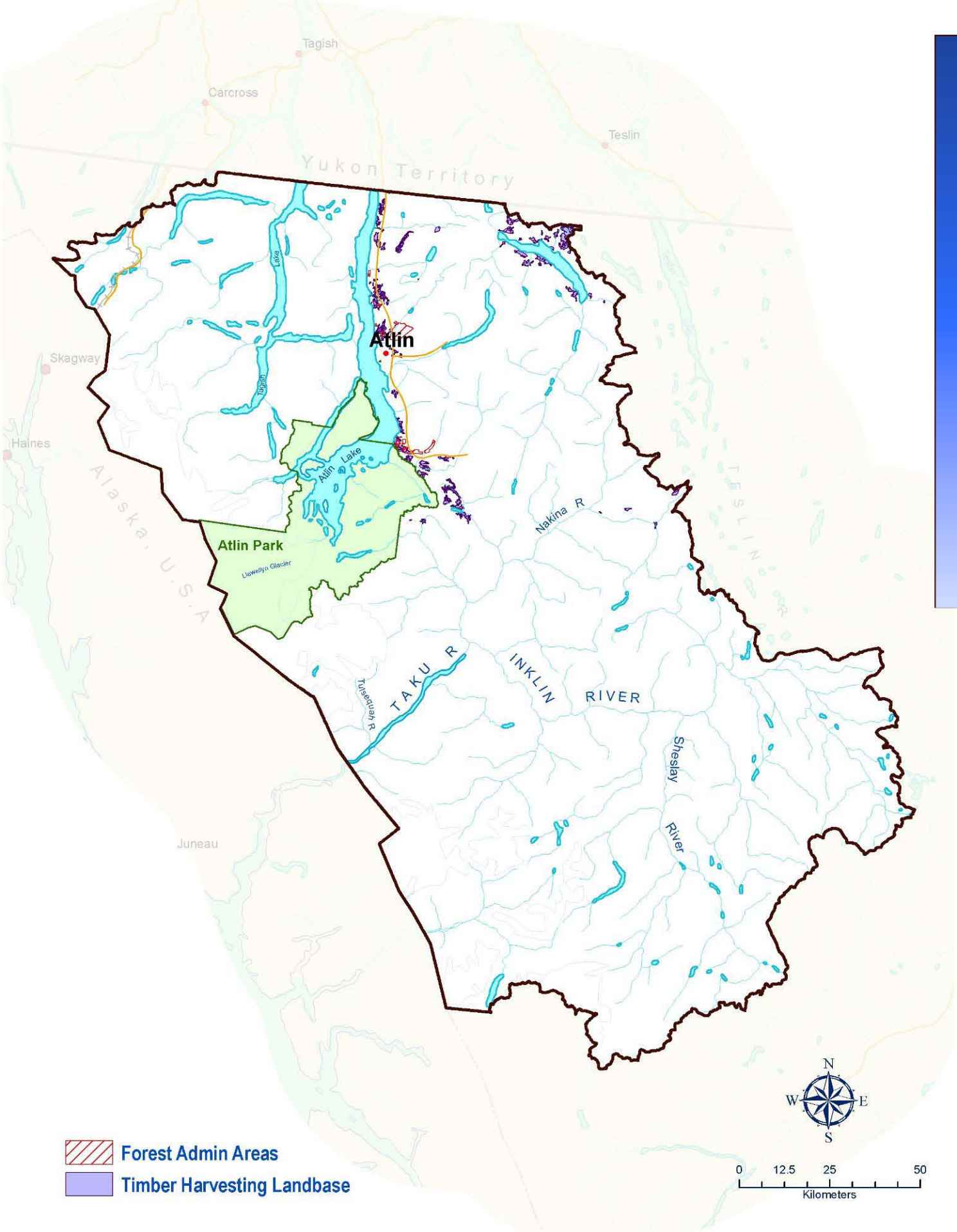
Free use Permits and Forestry Licenses to Cut generally occur within the Forest Administrative Areas. The MOF only issues referrals for activities outside of these areas. It is estimated that the current harvest demand within the forest administrative areas can be met for approximately the next 10 years.

Timber Harvesting Land Base

Timber Harvesting Land Base (THLB) identifies all locations where harvesting could occur under replaceable and non-replaceable forest licenses based on Timber Supply Review 2 (TSR2) analysis. Areas that would not be harvested such as riparian reserves and sites of low productivity are removed. The total THLB for the Cassiar TSA is 200 000 ha or 1.3% of the TSA land base. There is a total of 32 000 ha of THLB within the plan area.

> Uses in Planning: Identification of resource use conflicts; assessment of the implications of land use decisions on timber harvesting activities.

MAP 13: Forest Resources



MAP 14: GEOLOGY

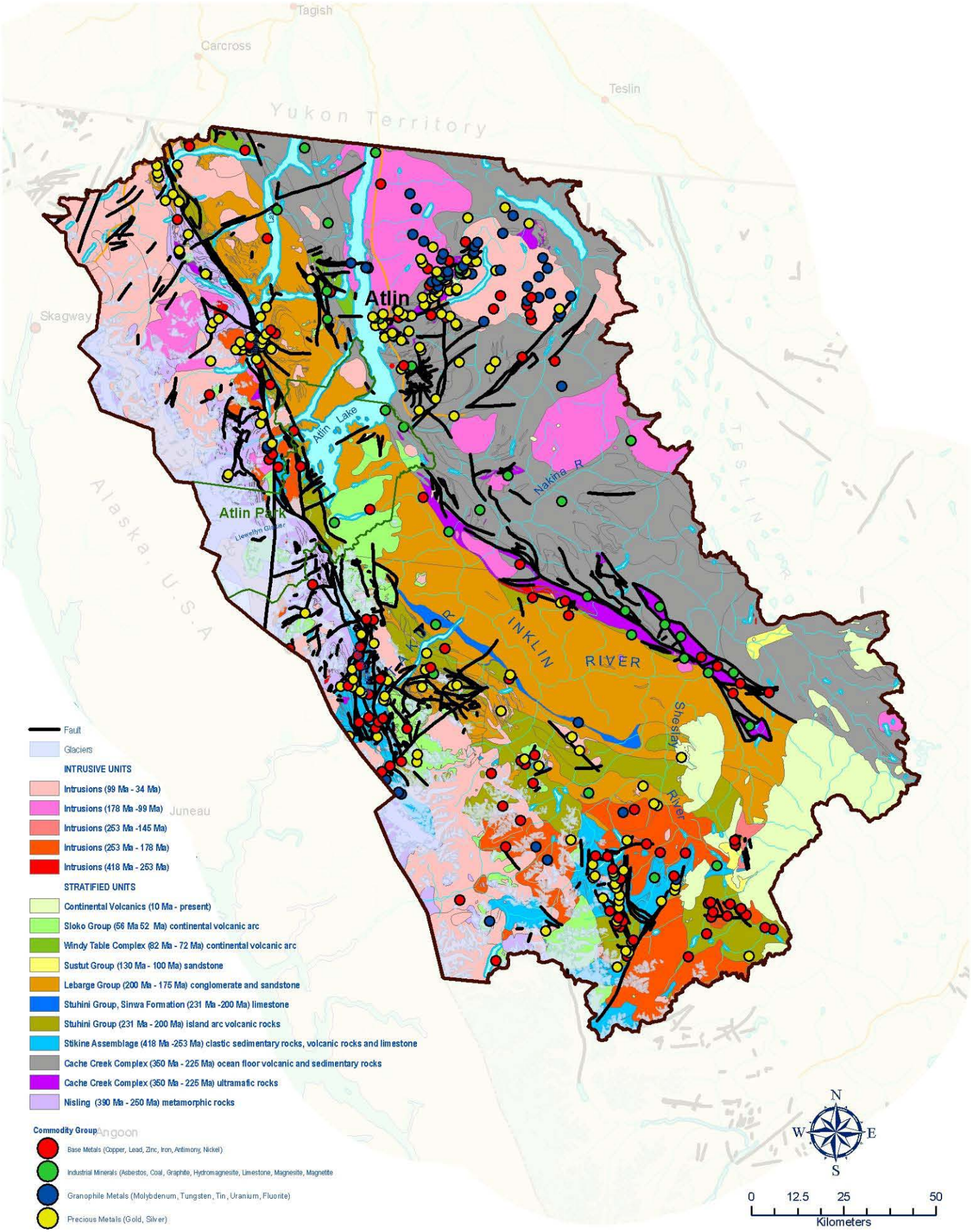
The plan area spans five parallel northwest geologic belts. From west to east these are:

- Coast Plutonic complex - granite and related intrusive rocks in a narrow belt lying along the Alaska border
- Yukon-Tanana terrane - metamorphic rocks
- Stikine terrane - island arc volcanic rocks
- Whitehorse trough - sedimentary rocks
- Northern Cache Creek terrane - a wide belt volcanic, sedimentary and ultramafic rocks from an ocean floor

All five belts are covered locally by continental volcanic rocks and intruded by granite.

> Uses in Planning: To assist in the identification and refinement of high mineral interest areas and potential resource conflicts

MAP 14: Geology



MAP 15: MINERAL POTENTIAL AND OCCURRENCES

To provide readily useable mineral resource information for the land use planning process, the Geological Survey Branch of the British Columbia Ministry of Energy, Mines and Petroleum Resources undertook mapping of mineral potential for the Atlin – Taku plan area in the fall of 2008.

Mineral Potential maps present an evaluation of the mineral potential of an area using quantitative analysis based on geological mapping (1:50,000), an integration of geochemical and geophysical data, and knowledge of economic geology at the time of the assessment.

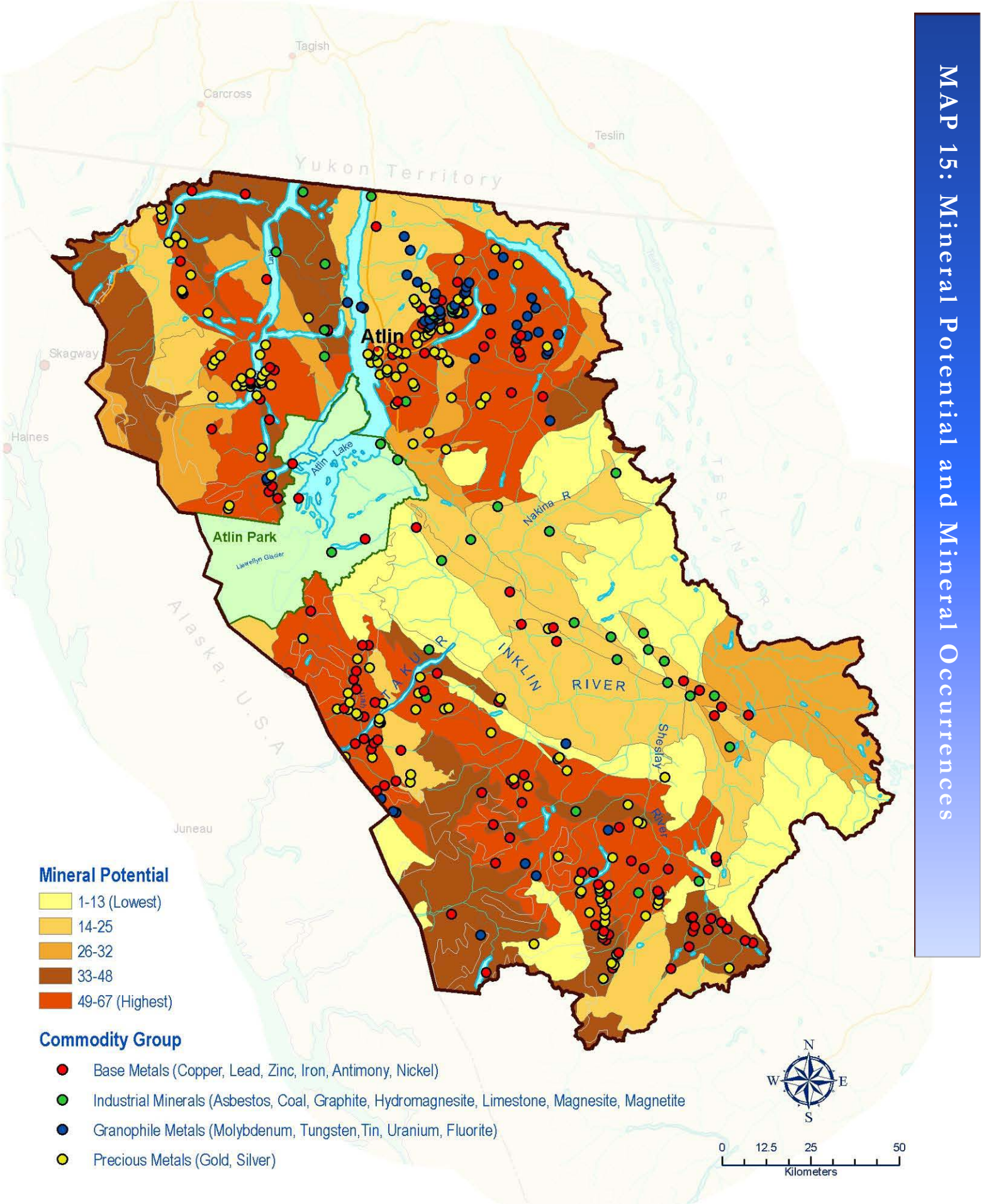
Objectives were three fold;

- Rank the land base of the province by its ability to support economic activity through mineral exploration and extraction.
- Produce results which are credible and understandable by all user groups, to assure the results of the analysis are used in the land-use planning process.
- Incorporate the expertise of the mining and exploration communities.

Mineral occurrences are locations where some form of mineral activity has occurred in relation to a site specific location as recorded in the provincial mineral inventory database, MINFILE. MINFILE contains geological, location and economic information on over 12 300 metallic, industrial mineral and coal mines, deposits and occurrences in B.C. A mineral occurrence is defined as in-situ bedrock or placer mineralization, on surface, in drill holes, or in underground workings. Occurrences are mapped by four commodity groups: base metals, industrial minerals, granophile metals, and precious metals.

> Uses in Planning: Identifies areas of potential significance for mineral development activity and potential resource conflicts; assessment of the implications of land use decisions on mineral development activities

MAP 15: Mineral Potential and Mineral Occurrences



MAP 16: MINING EXPLORATION AND ACTIVITY

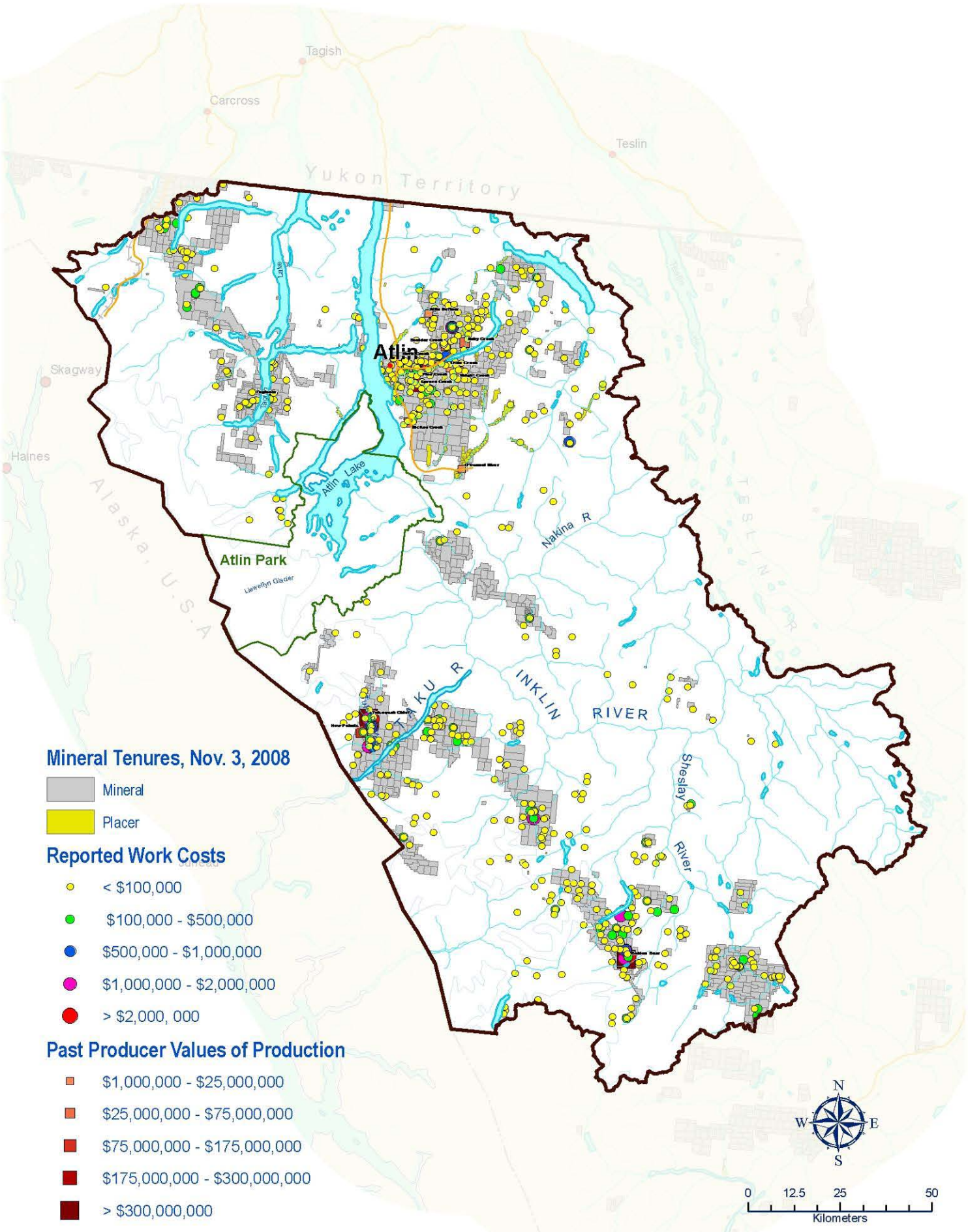
The Mineral Activity map is a compilation of several different data sources including the BC Assessment Reporting Index System (ARIS) and mineral tenure data. This data shows where mineral activity, primarily related to mineral exploration activity rather than development activity, is located.

Recorded mineral exploration work within BC is captured in the Assessment Report Index System (ARIS) database. Mineral exploration assessment reports filed in ARIS provide information on geological, geophysical, geochemical, drilling and other exploration-related activities throughout B.C It is important to note that ARIS is only a partial record of mineral exploration work in BC. Historical work completed prior to 1947 is not included in the records. New filings remain confidential for one-year so are also not available. Also, some exploration work is done more on a regional scale and can not be applied to a specific mineral property so is not recorded. From ARIS, a rough estimate of the scope of the work by reported work costs from less than $100 000 to greater than $2 000 000 can be extracted and is shown on the map.

Mineral tenures are broken down as applying to mineral or placer activity and have a term of expiry associated with the license or lease. Mineral tenure applications in process are included on the map. It is important to note that this data changes regularly as mineral applications are received on-line. The currency of the data is shown on the map.

> Uses in Planning: Provides a snapshot of current mineral activity and areas of known mineralizations; gives a reasonable indication of areas of previous mineral activity; broadly correlates metallic mineral activity with underlying geology; identification of resource use conflicts and assessment of the implications of land use decisions on mining activities.

MAP 16: Mining Exploration and Activity



MAP 17: COMMUNITY VALUES

This data was prepared with the citizens of Atlin to determine and map areas of special interest to the community. Places of special interest include those with:

- Recreational significance where members of the community recreate (hike, camp, bike, etc.);
- Resource significance where members of the community regularly hunt or gather food and other resources;
- Historical significance; and,
- Natural significance.

In total, twenty Atlin community members contributed their special places. Places of value to residents were mapped and linked to a corresponding attribute list of "special places." Each place is classified as having either: recreation, resource, natural or historical significance. Additionally, it contains a description of the area/place and why it is important. Only those features that could be considered of value to the entire community were included on the final map.

In total participants listed 79 places of value (see table). There were 30 with recreational significance, 29 with resource significance, 24 with natural significance, and 12 with historical significance. Many had overlapping significance classifications. The vast majority of places of value to the community occurred in close proximity to Atlin, or was easily accessible by roads.

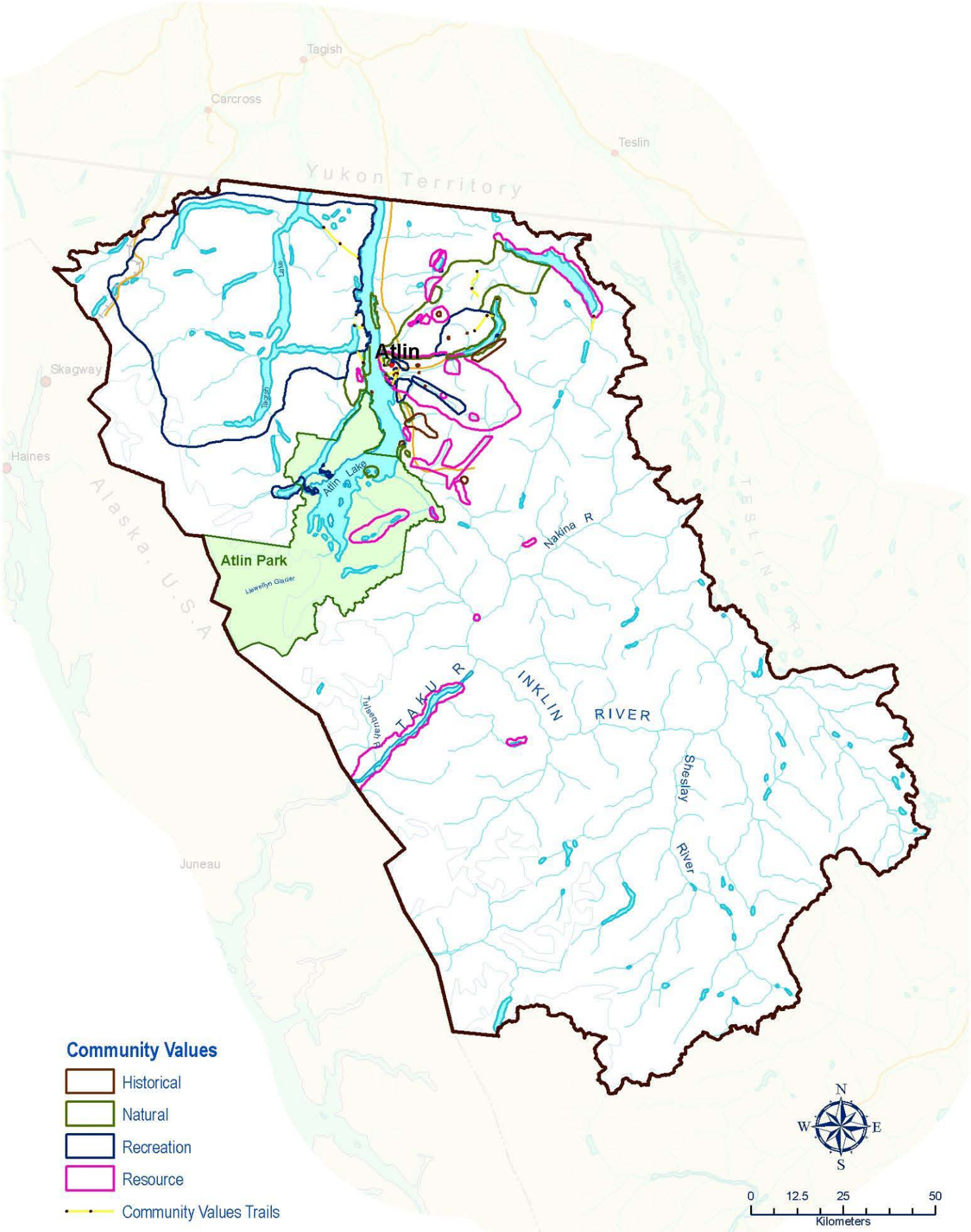
Key to Community Values

	Place	**Category**
1	Monarch Mountain	Recreation ,Natural
2	Warm Springs	Natural ,Recreation
3	Pine Creek Beach	Recreation
4	4th of July Creek	Resource, Natural
5	Pine Creek Falls	Natural
6	Sentinal Mountain - Elderado Trail	Historical, recreational
7	Atlin Mountain	Natural
8	Union Mountain Ridge	Natural, Resource
9	The Grotto	Natural, Resource
10	Dixie Lake	Resource, Natural
11	Moose Lake	Historical, Recreation, Resource
12	Tarahne Gulch Road	Recreation
13	Whitepass Railway	Recreation, Historical
14, 18, 19, 20	Hiking trail to Graham Inlet	Recreation, Historical
15	Road by Como Lake to Atlin Lake	Recreation
16	Drinking spring (Pine Creek beach)	Natural
17	Cracker Creek	Recreation, Natural
18	Logger Bay	Recreation, Resource
20	Pillman Hill	Recreation
21	Como Lake	Recreation
22	Pine Creek Flats/reserve	Recreation, Natural
23	Atlin Lake Islands	Natural
24	Warm Bay Road	Recreation, Resource
25	Ponds between Como and Atlin Lake	Natural
26	Islands in Atlin Lake	Natural
26	Islands in Atlin Park by Anderson Bay	
28	Campground (SW end Surprise Lake)	Recreation
29	Challenge Lake	Resource

	Place	Category
30	At confluence of Spruce Cr, McKinnley Cr and Bull Cr	Resource
31	Spruce creek	Resource
32	Discovery	Historical
33	Birch Lake Miners Campground	Recreation
34	Camping area on Porter lake	Recreation
35	NW side of Porter Lake	Resource
36	NW of Steamboat Mountain	Resource
37	N. end of Surprise Lake by 4 crown mountain	Historical
38	Surprise Lake campgrounds	Recreation
39	SW end of McDonald Lake	Resource
40	McDonald Lake Park campground	Recreation
41	Area N. of O'Donnel River and E. of Wilson Creek	Resource
42	Gypsum/Alkali Flats	Natural
43	Steamboat Mountain	Natural
44	Atlin Silver Mine	Historical
45	McDonald Lake	Resource
46	By Jones Lake	
47	South end of Surprise Lake	Resource
48	Noland Mine	Historical
49	Frog / Anchor Rock	Historical
50	Teresa Island Historical Rock	Historical
51	Cemetery and Trail	Historical, Recreation
52	Consolation road	Resource
53	Trout Spawning bed in Atlin Lake	Natural
54	Warm Bay area	Natural
55	Porter /Indian Lake	Resource, Recreation,
56	Pike Lake	Resource
57	Palmer Lake	
58	McDonald Lake	Resource
59	Gladys Lake	Resource
60	Eva Lake/Angel Lake	Resource
61	McKee Creek	Resource, Recreation
62	Blue Canyon (roaded area)	Resource
63	Consolation Creek	Recreation
64	Ruby Mountain and valley	
65	O'Donnel townsite (N. of Dixie Lake)	Historical
66	Trails to Trout lake	Recreation
67	Simpson Lake	Resource, Recreation
68	Surprise Lake	Natural
71	Wilison Bay/Creek	Natural
72	Peggy's cove (in park)	Natural, Recreation
73	1st and 2nd narrows (in park)	Natural
74	Katina Creek and Lake	Resource
75	King Salmon Lake	Resource
76	Taku River system	Resource
77	Confluence of Nakina / Sloko Rivers	Resource
78	Area between Tutshi Lake and Tagish Lake (Taku Arms)	Recreation
79	Route between Atlin Lake-Taku Arm	Recreation
	Atlin Slough	Natural
	Atlin Park	Natural, Recreation
80	Boulder Creek	Historical
81	Old headboard	Historical
82	Spruce Creek	Recreational, Resource
83	Old Fumes	Historical
84	Just south of 4th of July Creek	Recreation, Resource
85	Gun Range	Recreation
86	Unnamed hiking trail	Recreation
87	Forestry Campground on Atlin Lake	Recreation

The Grotto, a warm spring in Atlin and just one of many special features identified on the Community Values map

MAP 17: Community Values



MAP 18: BC PROTECTED AREAS AND THE PROTECTED AREAS STRATEGY

Protected Areas

Two protected areas currently exist within the plan area, Atlin Provincial Park and Tarahne Provincial Park. Atlin Park is a remote 207 0006 ha park covering the south end of Atlin Lake and the rugged, ice-covered mountains to the west.

Tarahne Provincial Park covers 3 ha within the town of Atlin, and is mainly used for community recreation purposes. The park is managed on a volunteer basis by the Tarahne Park Board, which is made up of local residents. The M.V. Tarahne, a notable historic landmark in Atlin, has been restored and now sits on the shores of Atlin Lake in the park. This boat plied the water of Atlin Lake during the 1920's taking tourists to see the surrounding scenery. The Atlin Historical Society offers guided tours.

BC Protected Areas Strategy

In 1992 the provincial government developed an action plan to protect parks, recreation areas and protected areas in British Columbia. "Towards a Protected Areas Strategy (PAS) for B.C." committed B.C. to a single vision for protected areas and consolidated previous land use planning.

At that time it was recognized the British Columbia's existing protected areas system met many of recreational and conservation needs. However, it fell short of representing the full diversity of biological, natural and cultural heritage resources and recreational opportunities. Some areas, interests or values were not represented as well as others; some were not represented at all. Even within some well-represented areas, existing protected areas tended to over-represent alpine ecosystems and under-represent mid- and low-elevation ecosystems. On this basis, by 2000, the provincial government fulfilled its commitment to developing and expanding a protected areas system that now protects over 12% of the province.

Additional areas that were proposed for some level of protection but have not received designation to-date, form a basis for options around future protected areas. There are two types of proposed protected areas:

Goal 1: Representativeness

To protect viable, representative examples of the natural diversity of the province, representative of the major terrestrial, marine and freshwater ecosystems, the characteristic habitats, hydrology and land, forms, and the characteristic backcountry recreational and cultural heritage values of each ecosection.

Goal 2: Special Features

To protect the special natural, cultural heritage and recreational features of the province, including rare and endangered species and critical habitats, outstanding or unique botanical, zoological, geological and paleontological features, outstanding or fragile cultural heritage features, and outstanding outdoor recreational features such as trails.

Protected Areas Strategy Goal 1 Protected Areas

Name	Area (ha)	Percent (plan area)
Nakina Canyonlands	180 294	6
Tutshi Skagway	34 595	1
Teslin River	72 082	2
Total Goal 1:	286 971	9

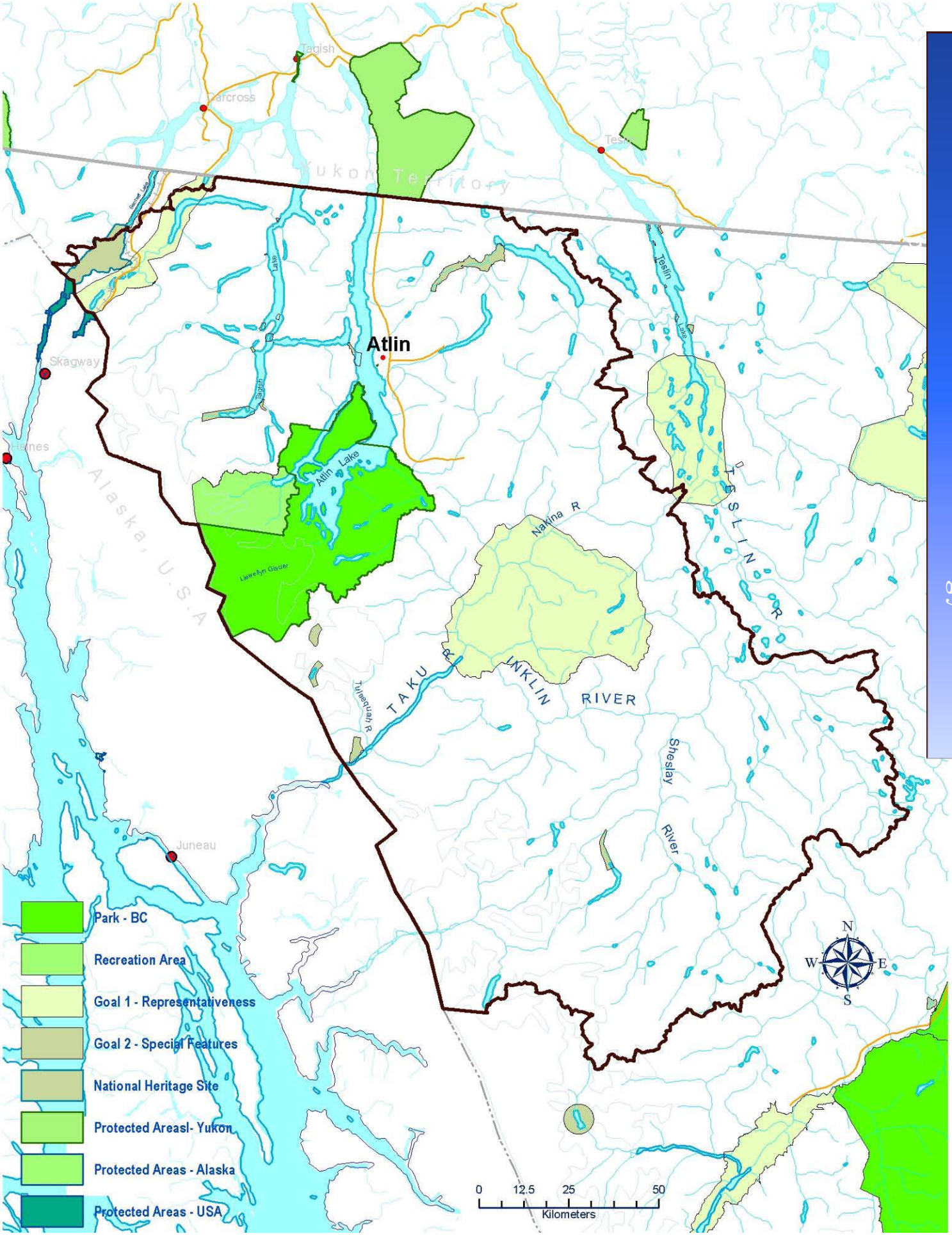
Protected Areas Strategy Goal 2 Protected Areas

Name	Area (ha)
Atlin River/Scotia Bay/Taku Landing	875
Ben-My-Chree	3 198
Bennett Lake	2 558
Deep Bay	226
Deep Bay Islands	118
Fantail River	103
Flanigan Slough	1 591
Fourth of July Creek ERP#286	5 502
Golden Gate/ Kips Cove	388
Mailbox Point	42
Racine Falls	76
Tatsamenie Lake Outlet	1 533
Tulsequah and Lakeno Lakes	2 516
Tutshi Island	2
Tutshi River	59
Wann River	228
Total Goal 2:	19 015

Viewing core samples taken from Ruby Creek

Fish catch on the lower Taku River

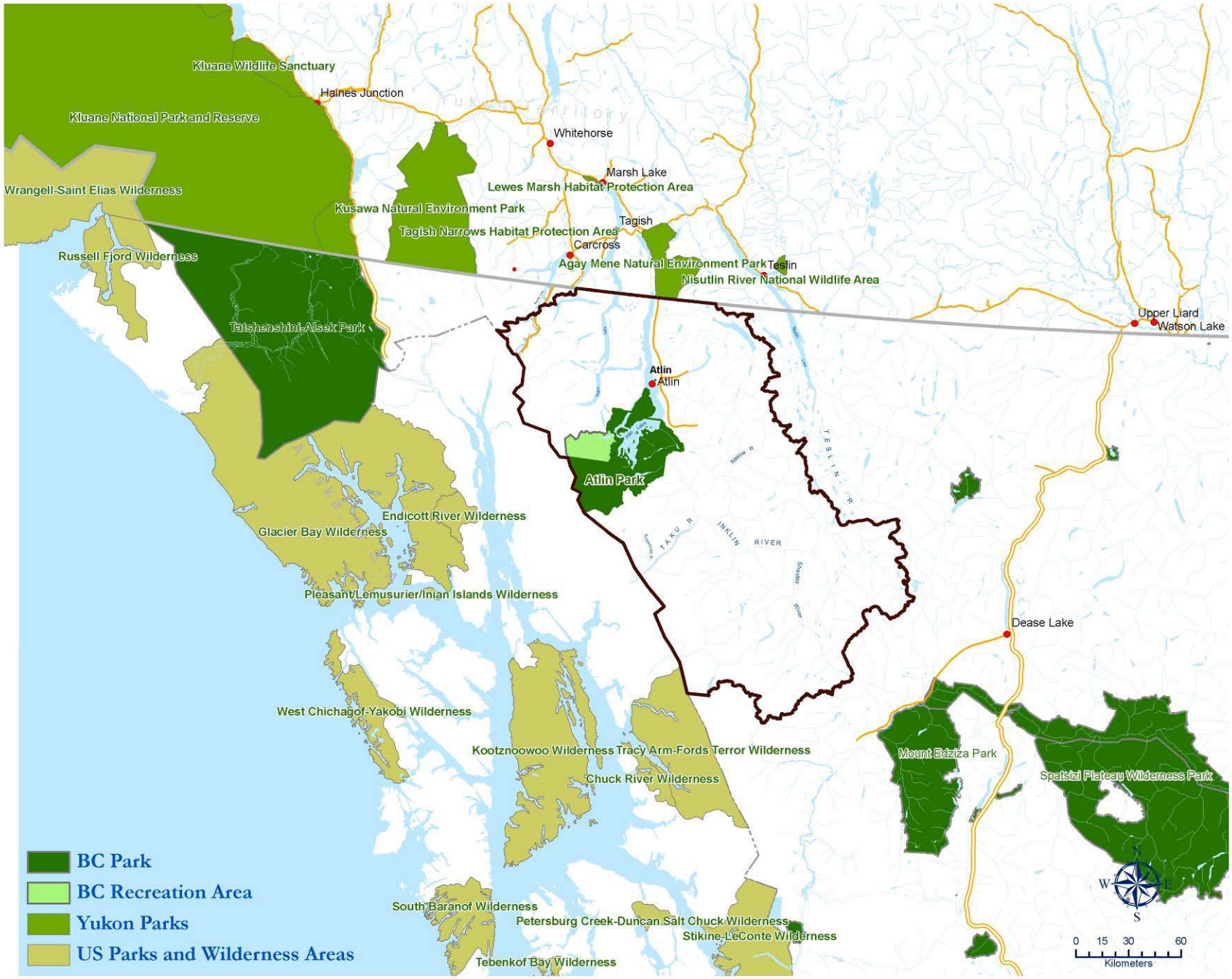
MAP 18: BC Protected Areas Strategy



MAP 19: INTERNATIONAL/NATIONAL PROTECTED AREA CONNECTIVITY

This map represents a regional view of protected areas in British Columbia, the Yukon and Alaska. [Detailed description to come.]

MAP 19: International/National Protected Area Connectivity



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INTERIM MEASURES

Various temporary measures are included in the Framework Agreement to maintain culturally significant areas and important conservation areas while the joint planning process is underway. These measures are also intended to make resource development decisions more streamlined and effective. These measures will be replaced in three years by the planning products from the Joint Land Forum.

MAP 20: NO REGISTRATION RESERVES AND NO COMMERCIAL HARVEST ZONES

No Registration Reserves

No Registration reserves (NRRs) are established under Section 22 of the Mineral Tenure Act. A reserve may be established for a number of reasons as listed in Section 22(2) of the Mineral Tenure Act, but the most common are to either prohibit registration of a claim or to restrict the rights acquired. A claim cannot be registered within an area on or following the effective date of the reserve. The afore-mentioned wording reads "claim," not "mineral title," which signifies that an existing valid claim can still be surveyed and taken to lease in an area over which a No Registration reserve has been established subsequent to the registration of the claim. Map 19 includes all no staking reserves (i.e. no registration reserves) in the plan area (shaded grey), along with those that have been established as a result of the Framework Agreement (blue hatched).

A total of 330 803 ha, or 11 % of the land use agreement area, has been set aside as no registration reserves for the duration of the land use planning project.

> Uses in Planning: As an interim strategy to prevent staking of new mineral claims in areas of high ecological and cultural value while planning is underway. These interim measures are not the final outcome of a land use plan. This approach is unique in that interim matters have not in the past been implemented prior to the completion of a land use plan.

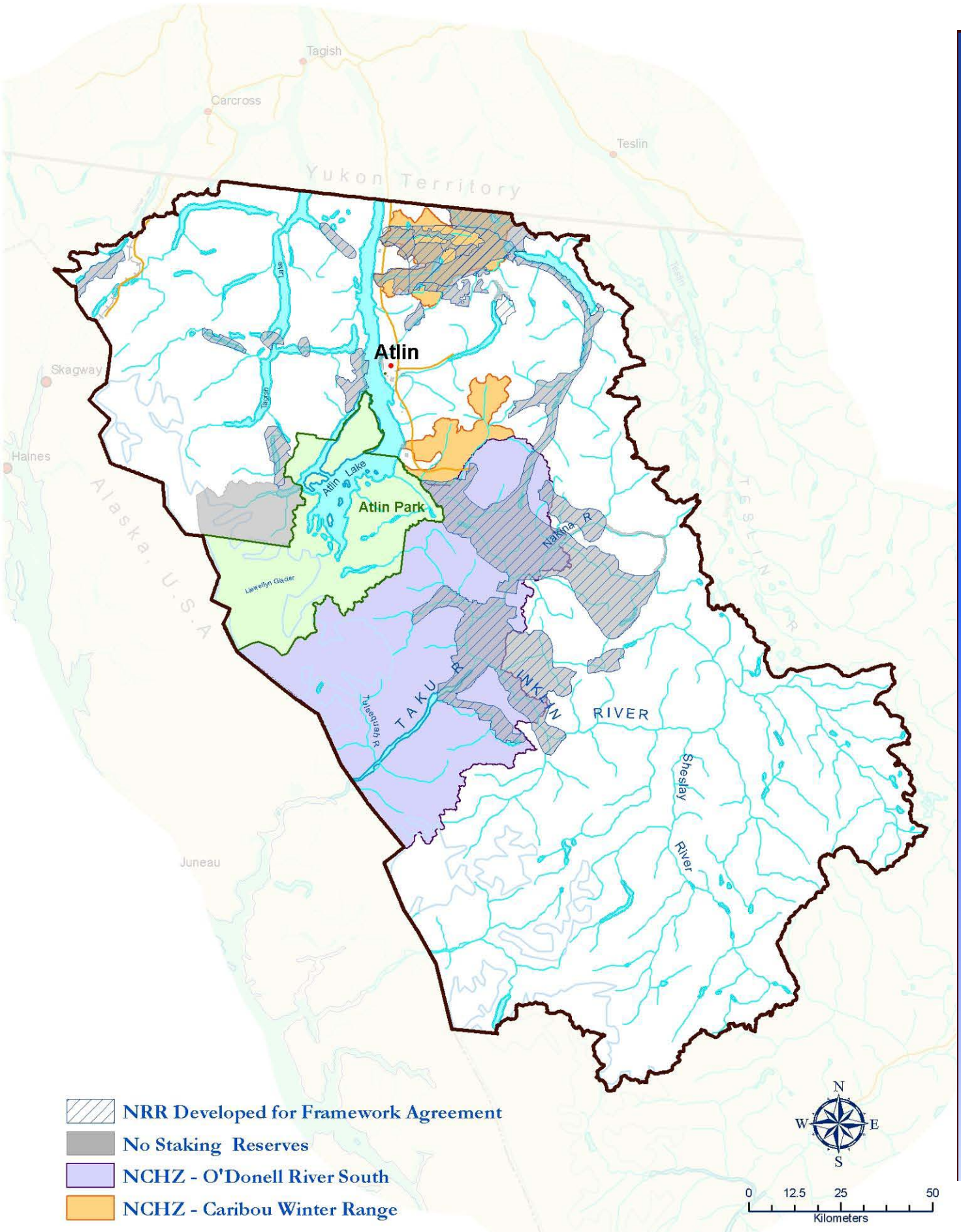
No Commercial Harvest Zones

No Commercial Harvest Zones (NCHZ) reserve land from large-scale commercial forest harvesting under replaceable or non-replaceable forest licenses. Administrative Areas previously identified by the Ministry of Forests and Range are excluded from these zones. NCHZs are established under Section 93.4 of the Land Act and are in place for a two-year period during the completion of the Land Use Agreement.

A total of 557 027 ha, or 18 % of the land use agreement area, has been identified as No Commercial Harvest Zones for the duration of the land use planning project.

> Uses in Planning: As an interim strategy to large-scale commercial harvesting in areas of high ecological and cultural value while planning is underway. These interim measures are not the final outcome of a land use plan. This approach is unique in that interim matters have not in the past been implemented prior to the completion of a land use plan.

MAP 20: No Registration Reserves and No Commercial Harvest



MAP 21: LAND ACT DESIGNATIONS UNDER THE FRAMEWORK AGREEMENT

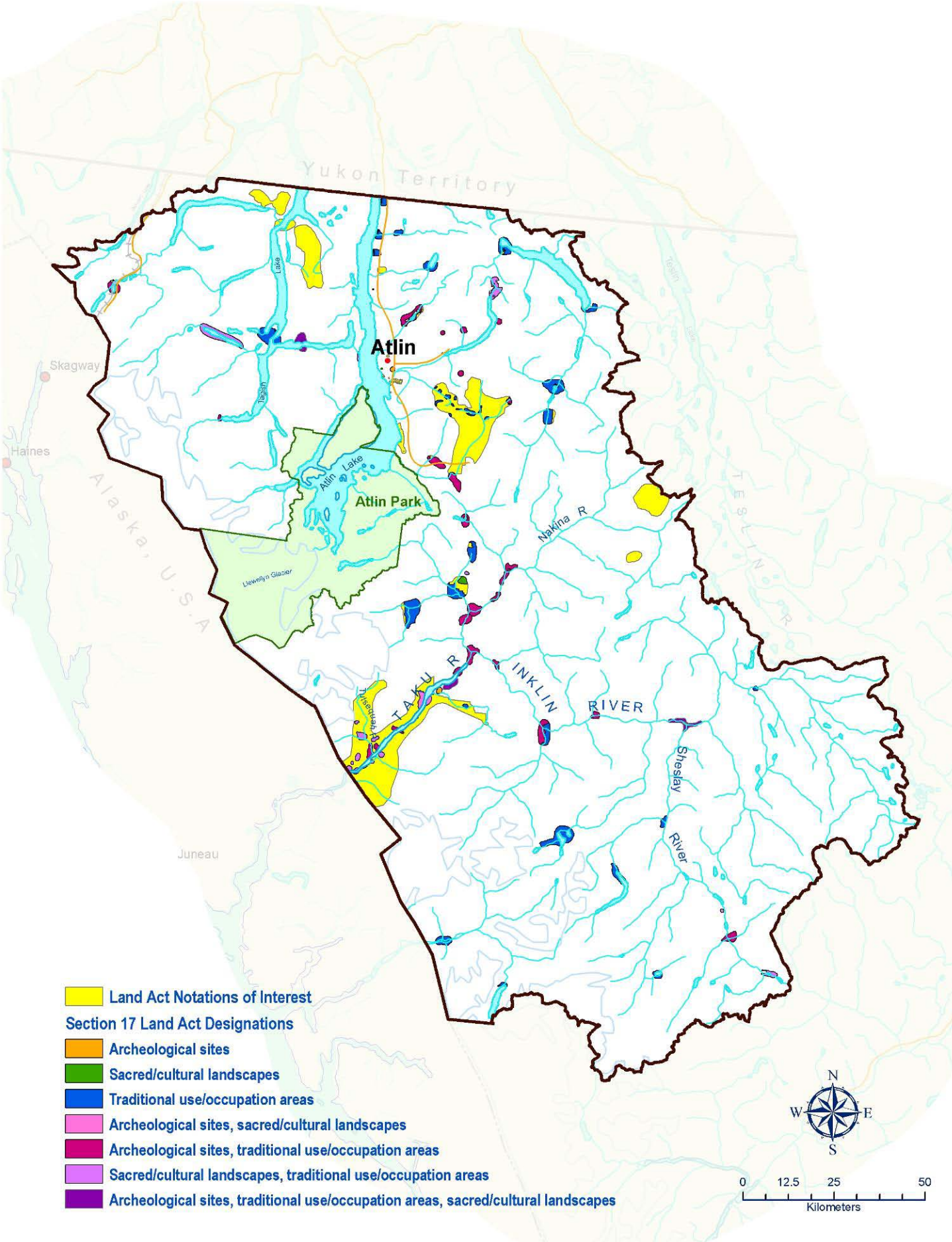
A notation of interest (NOI) is an administrative tool established in recognition of a short-term interest in Crown land by a provincial ministry or agency. It is recorded on provincial reference maps. Crown land cannot be sold within an NOI. However, an NOI does not preclude the acceptance and adjudication of Crown land applications in the subject area. Short-term NOIs are established for a period of less than two years and are not renewable.

Conditional withdrawls are established under the Land Act, Section 17 for the conservation of natural or heritage resources. These areas are withdrawn from disposition under the Land Act for any purpose that is not compatible with the purpose for which the land has been designated.

A total of 4 098 ha, or 0.1 % of the land use agreement area, has been identified as Notations of Interest for the duration of the land use planning project.

> Uses in Planning: May be used to ensure a referral is received for land applications associated with Crown land disposition in a specific area while the land use planning process is underway. It may also be used to ensure the involvement of such agencies in planned disposition projects. This approach is unique in that interim matters have not in the past been implemented prior to the completion of a land use plan.

MAP 21: Land Act Designations Under the Framework Agreement



MAP 22: KNOWN FISH SPECIES LOCATION

The goal of the provincial Fisheries program is to conserve the natural diversity of fish and fish habitat and to sustainably manage the freshwater sport fishing in B.C. The province exercises delegated authority, under the federal *Fisheries Act*, for the management of non-salmon freshwater fisheries[2].

The known fish species location map refers to inland waters fish species distribution, mapped as points. These are fish species under provincial jurisdiction. Note not all inland fresh waters species are displayed, only a subset for which management in the planning area is relevant.

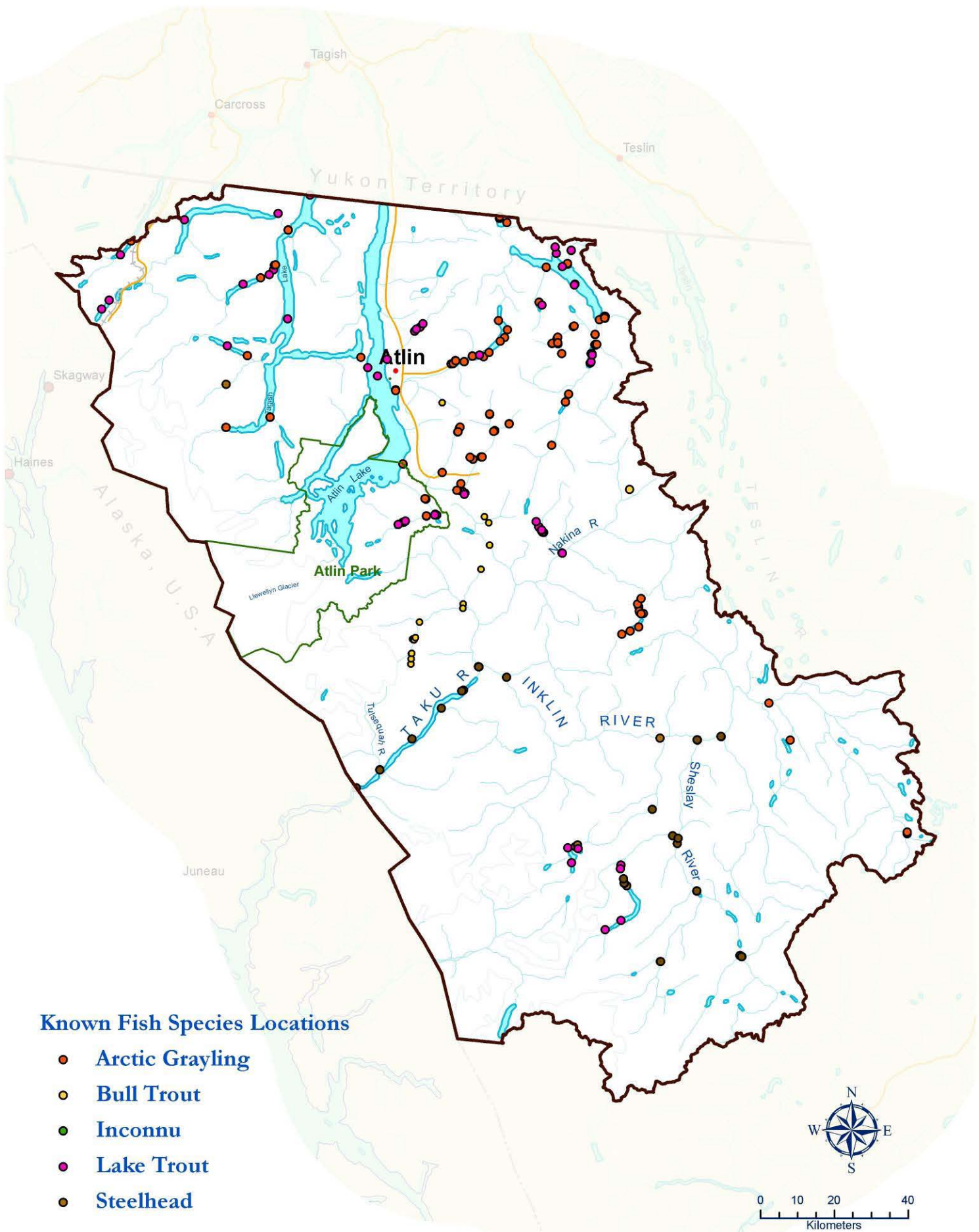
This map is based on data from the Fisheries Information Summary System (FISS) database. Each point represents either a specific site where a fish species has been identified or the point represents a whole stream in which the fish species is known to be present. These latter whole stream points are always located at the stream mouth.

MAP 23: SALMON DISTRIBUTION AND SPAWNING

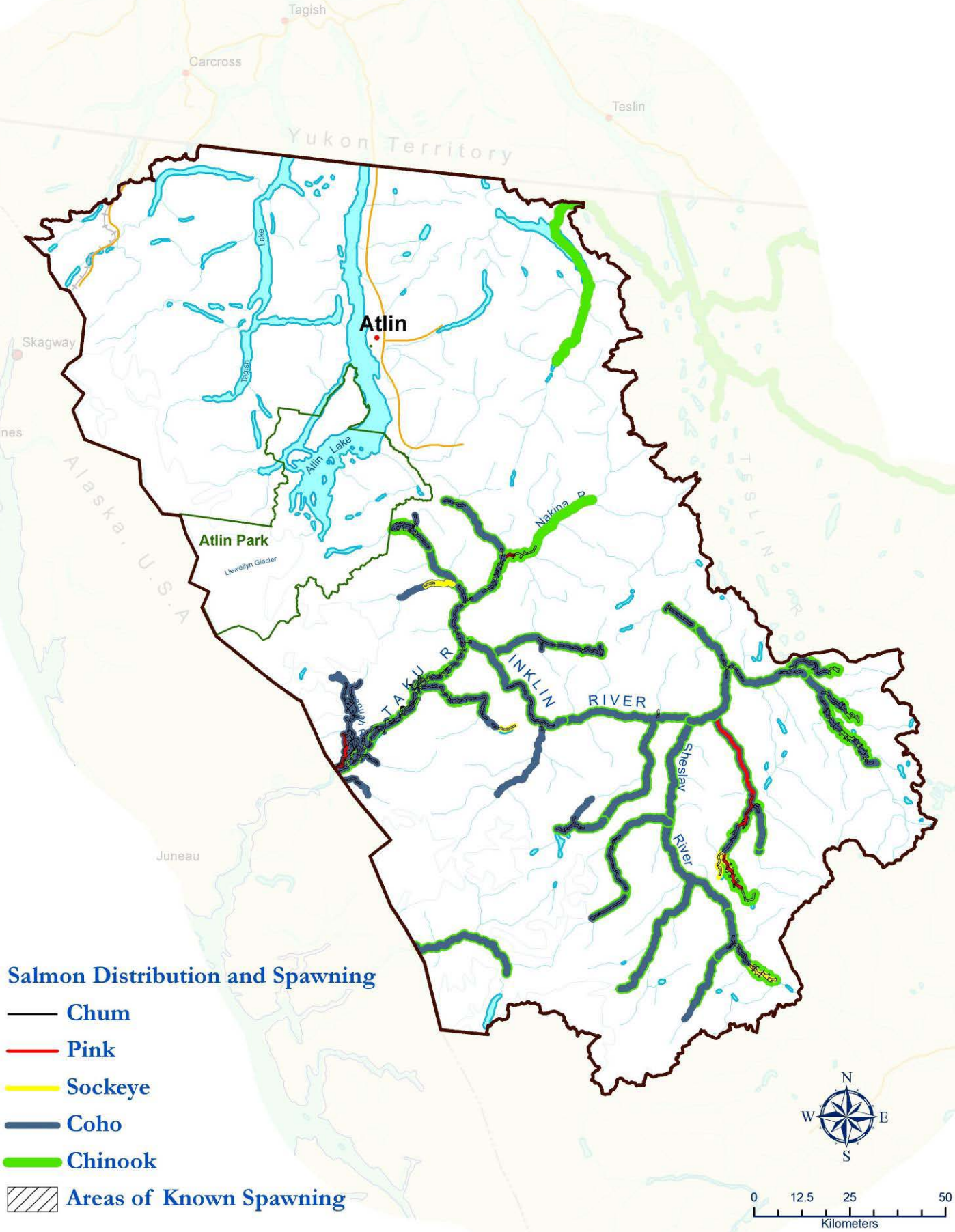
The salmon distribution and spawning map contains information from DFO and the Taku River Tlingit. This data set contains information on the distribution of sockeye, chum, Chinook, Coho and pink salmon, and on the known or estimated salmon spawning habitats. [more detailed description to come].

[2] http://www.env.gov.bc.ca/fw/ - Ministry of Environment Fish and Wildlife Homepage.

MAP 22: Known Fish Species Locations



MAP 23: Salmon Distribution and Spawning



WILDLIFE HABITAT SUITABILITY MAPS

As part of the planning preparation, the TRTFN and BC are jointly developing wildlife habitat information for the plan area. Both parties have over the years independently developed wildlife habitat information for the region, but at varying scales, scope, standards, using different information sources, and with different applications. The TRTFN and BC recognize the need to have mutually acceptable habitat models for use in the planning process.

It is important to remember, that while habitat ratings were developed for both the Land Use Plan Area and the Collaborative Fish and Wildlife Management Area. It is the habitat mapping and ratings within the Land Use Plan Area that needs to be reviewed at this stage of the process.

Purpose and role
The purpose of the wildlife habitat suitability modeling is to provide an estimate of the quality of wildlife habitats and their distribution in the plan area. This information can be used in the assessments of land use choices and the tradeoffs which may be required to support land use decisions. Habitat mapping is being completed on five species: Stone's Sheep (*Ovis dalli stonei*), mountain goat (*Oreamnos americanus*), woodland caribou (*Rangifer tarandus caribou)*, moose (*Alces alces*), and grizzly bear (*Ursus arctos horribilis*). These species are culturally important to the TRTFN, important to the Atlin community and the public, and serve to represent the ecological diversity of the plan area. These same species have been used by both parties in previous mapping projects in the plan area, and they have been used in land use planning processes in other regions of northern British Columbia.

Uses and limitations of the habitat models
The wildlife habitat modeling can be used to predict the quality and area of habitats at coarse scales for strategic land use planning. For example, the amount of high value habitat for grizzly bears can be reported for the entire plan area or by ecosection, watershed, or other planning unit. The mapping can be used as a layer of information overlaid on other natural resource information or cultural information to determine the overlap between values. It can also be used to identify core areas of high value habitats for all species, or in combination with culturally important areas to potentially indicate areas for a higher level of management. The key to using the information is remembering the wildlife habitat modeling was developed to estimate habitat quality and range at regional and subregional scales. The regional or strategic intent of the effort limits any fine-scale interpretation or use of the models, and the mapping in its current form should not be used to assess habitat loss or impacts from operational activities like road building, or mineral development activities. Higher resolution or finer scale mapping is required to capture habitat components not adequately mapped at these broad scales (e.g. mineral licks, springs, or microsite habitats (such as skunk cabbage for bears)). The mapping is not intended to predict population levels or even the presence of the species in any particular area, and cannot be used to estimate wildlife population numbers. For example, high value moose habitat is not intended to predict high numbers of moose. The modeling provides a relative value of the habitat based on current environmental conditions and structure. The models are based on existing Science, Traditional Ecological Knowledge, and Community/Local Knowledge of the important habitats for each species during each season. Thus, the areas identified on the maps represent the effort to translate the best available sets of knowledge and science of important habitats into predicted habitat values based on existing spatial information on vegetation and other environmental information available for the plan area.

Species Information and Model Assumptions
The purpose of the following information is to provide a brief explanation of each species' life history, forage, key seasonal habitats, special needs (e.g. mineral licks), and the main assumptions applied for each model.

The information is summarized from '*A Conservation Area Design for the territory of the Taku River Tlingit First Nation: Preliminary Results and Analyses*', BC species accounts for moose (Hawkes and MacLean 2003), woodland caribou (MacLean 2003), mountain goat (Hawkes 2003), grizzly bear (Wellwood 2003a), and thinhorn sheep (Demarchi and Hartwig 2004), and information for species in northern British Columbia.

The final technical wildlife habitat model report will include species accounts, detailed model rationales, and a list of references; the descriptions here are not intended to provide that level of detail but to provide a general summary of the information, assumptions, and models used for the process.

Stone's Sheep (Map 24 Summer Habitat & Map 25 Winter Habitat)

In the plan area there are Dall's Sheep (*Ovis dalli dalli*), Fannin Sheep and Stone's Sheep, with Stone's Sheep the most abundant. Fannin sheep are Stone's sheep, but are considered an intergrade between Dall's and Stone's sheep, and have similar color characteristics of both sheep. Fannin sheep are found in northwestern BC and the Yukon Territory. Stone sheep are found throughout northwestern BC and are patchily distributed in suitable habitats in the plan area. Dall's sheep (blue-listed (species considered as a special concern)) are found in the northwestern portion of the territory, representing the southwestern extent of Dall's sheep distribution, which is primarily within the Yukon Territory, Northwest Territories, and Alaska.

Life History
Stone's Sheep generally inhabit open mountain slopes, in the subalpine and alpine zones, and forage on grasses, forbs and shrubs. Rutting begins in mid-November and extends into mid-December. Gestation is approximately 175 days, with single young being born mostly between mid-May and June.

Seasonal Habitats
The TRTFN TIEK descriptions of seasonal habitats for sheep were summarized in Heinemeyer *et al.* (2003) as:

> *'During winter, sheep are described selecting habitats with low snow, while requiring the close proximity of steep, rocky areas for security. These winter habitat include high elevation, wind-blown areas; south-facing or warm aspect, steep areas or lower elevation areas below snow or at treeline. During summer, sheep are described as feeding in areas that are greening up as the snow melts. Summer habitats are high elevation areas, typically with open, rolling topography near escape terrain.'*

The elevational gradient used by some sheep populations in northern BC range from 1200 – 1900 meters in winter and over 2000 meters in summer (http://wlapwww.gov.bc.ca/omr/documents/U-7-006.pdf).

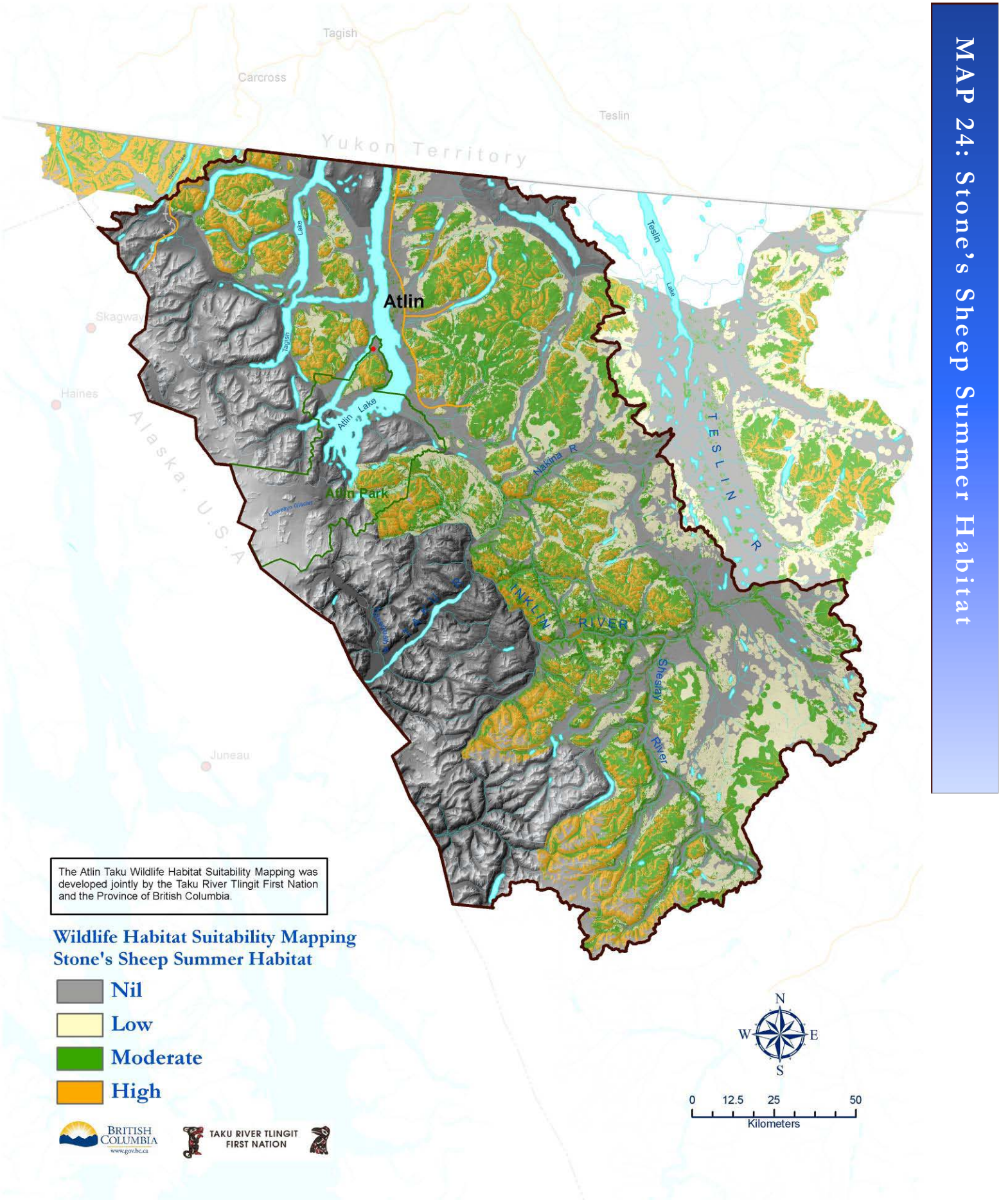
Forage
Sheep forage primarily on grasses, sedges, and shrubs with forbs being eaten as vegetation emerges in spring and summer. During the winter, grasses, shrubs, and sedges are foraged on exposed windswept areas or in lower elevation habitats with low snow depths. Stone's Sheep have been documented to avoid areas of forage when snow depth has exceeded 32 cm (Demarchi and Hartwig 2004).

Sheep will forage on alpine plateaus and slopes within proximity of escape terrain, and move higher as the green up of grasses, sedges and forbs occur during the spring and summer periods.

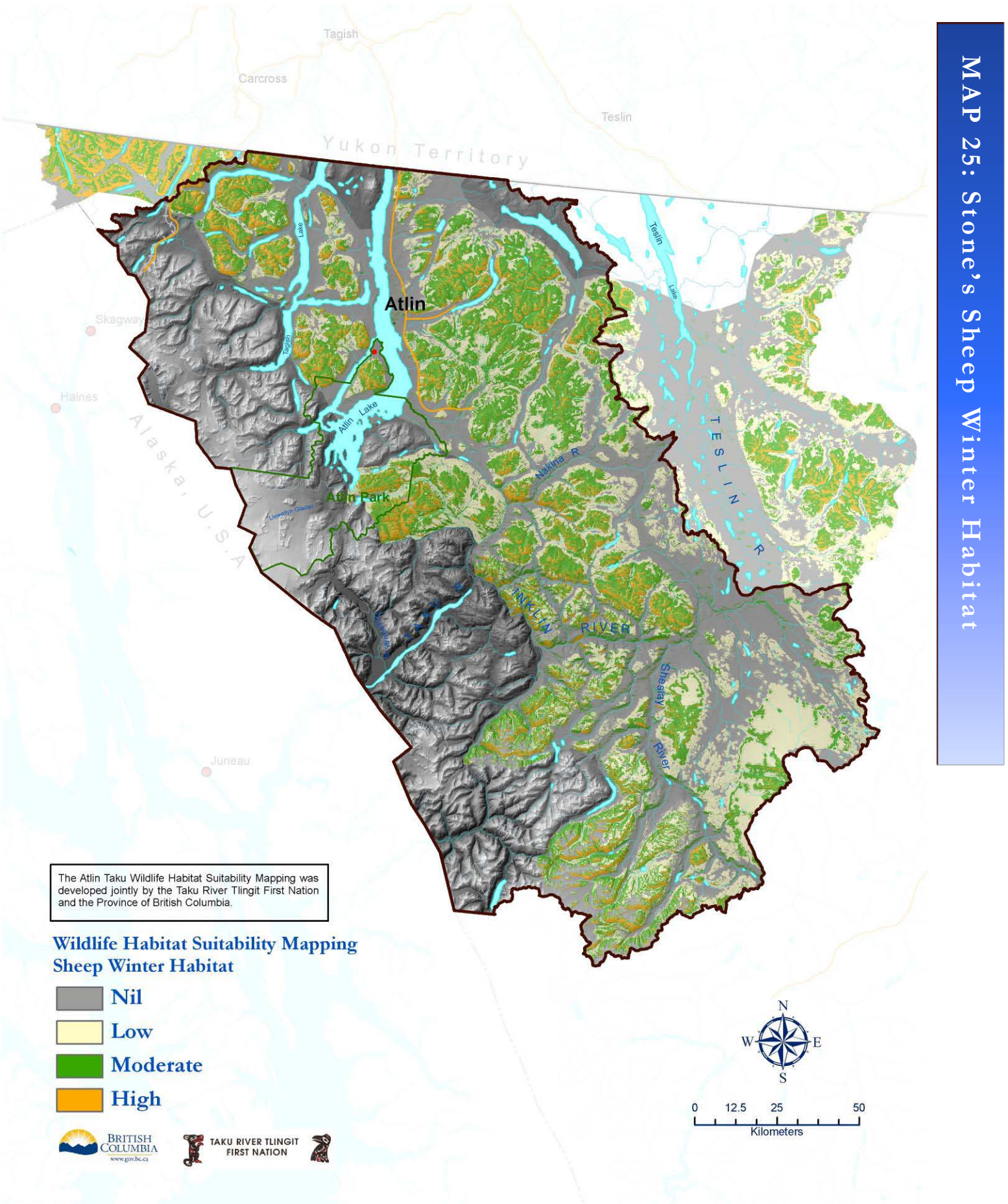
Special Needs
Stone's sheep can travel far from escape terrain to access mineral licks particularly in the spring and summer to restore minerals depleted through the winter and lambing periods or to obtain minerals not found in their forage (e.g. rams in Alaska have been recorded traveling 16 km to a lick as they moved to summer range (Demarchi and Hartwig 2004)). The trails and the licks are key site-specific habitats, which are important to sheep, but the distribution of these features in the plan area is poorly known.

Escape terrain habitats are steep, rugged, cliffs and rocky outcrops within a distance to foraging habitats or low snow areas (e.g. windswept ridges). Sheep will move to escape terrain when alarmed and to avoid predation. Escape terrain used by sheep has been described as slopes > 27-30 degrees (Demarchi and Hartwig 2004, Heinemeyer *et al.* 2003).

MAP 24: Stone's Sheep Summer Habitat



MAP 25: Stone's Sheep Winter Habitat



Mountain Goat (Map 26 Summer Habitat & Map 27 Winter Habitat)

Life History
Mountain goats generally inhabit steep mountain slopes, and can use forested, subalpine, and alpine habitats. Habitat use in coastal or higher snow depth climates can include low elevation forested habitats adjacent to steep slopes and habitat use in boreal and drier climates usually occurs in subalpine and alpine areas. Mountain goat diets are varied depending on the region; in dry regions, mostly grasses and sedges are eaten, and in wet areas, woody browse is important forage. Their diet can also change seasonally with herbaceous vegetation eaten as it emerges in spring and summer, and woody twigs, coniferous and deciduous trees, and lichen eaten in winter. Mineral licks are important to mountain goats in spring and summer and they are known to travel several kilometres to access the licks. Rutting begins in mid-November and extends into mid-December. Gestation is approximately 180 days, with a single young being born mostly between late May and early June.

Seasonal Habitats
The TRTFN TIEK descriptions of seasonal habitats for goats were summarized in Heinemeyer *et al.* (2003) as:

> *'…Generally, goats are found in steep, rocky and rugged mountainous areas. Food includes grasses and forbs, as well as brush such as willows; general foraging habitat was described as open habitats at high elevations and brushy habitats at lower elevations. While foraging, goats remain close to cliffs and rocks for security, and move into these habitats if alarmed. Several TRTFN interviewees described goat habitat use during winter. Goats are described as moving to lower elevations during periods of snow, including selecting areas just below snowline in the early winter and the use of forests, particularly at treeline when the snow is deep. Additionally, goats are described as using areas of low snow pack, such as on warm aspects, in wind-blown areas or steep terrain. Lambing occurs in the more rugged areas, which provide the kids with security. During summer, goats remained tied to security habitat, but generally use a wider diversity of habitats than are available during the winter months."*

The seasonal habitat relationship occurs at varying intensity in the plan area with coastal and transitional ecosystems having a significantly higher snow load than the boreal ecosystems (Hawkes 2003). This difference in seasonal habitat use and snow load has resulted in mountain goat habitat use being reported separately for boreal and coastal/transitional ecosystems.

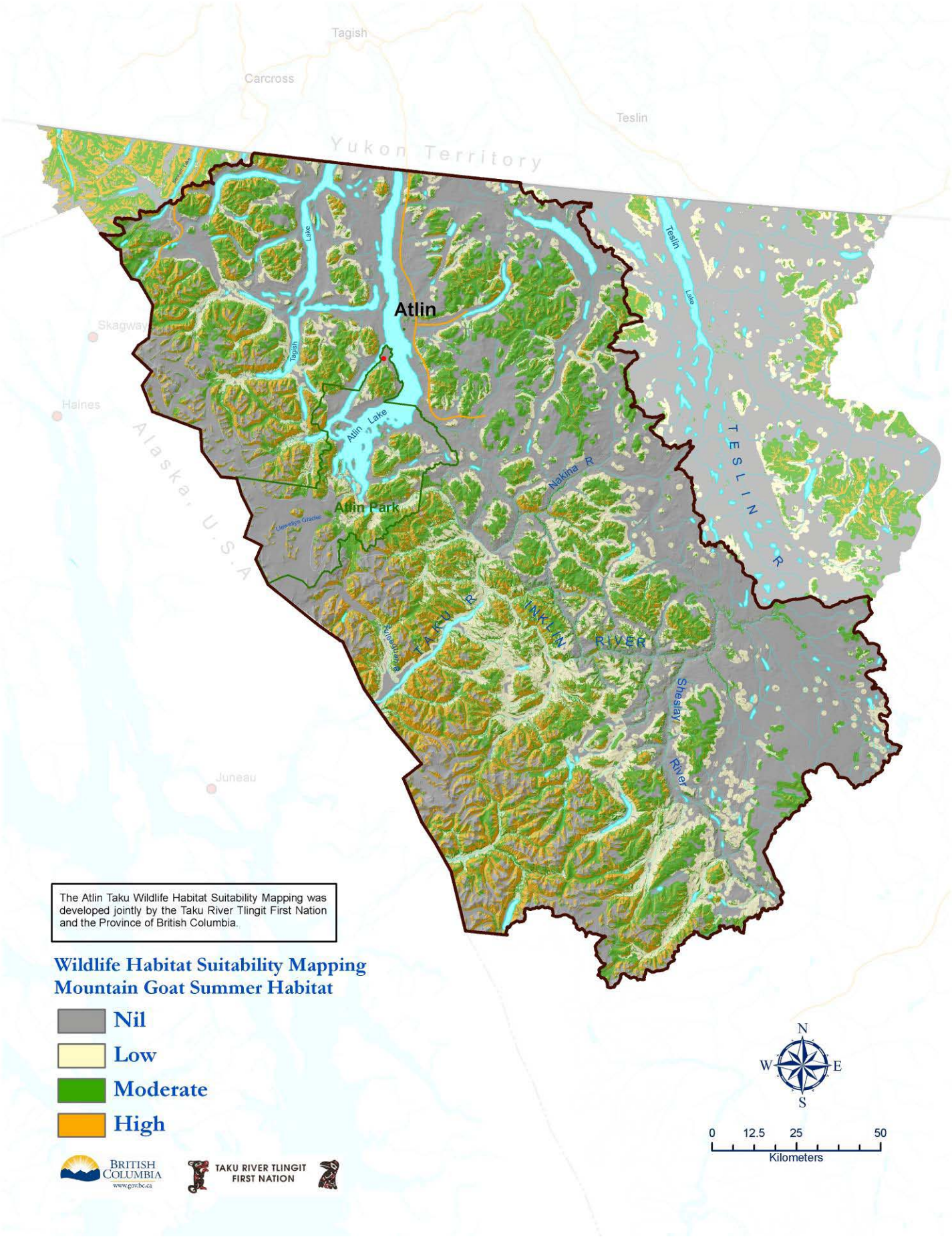
Forage
Mountain goat will forage on grasses, sedges, and forbs as vegetation emerges in the spring and summer. During the winter, woody browse, lichen, grasses, and sedges are foraged on exposed windswept areas or in lower elevation forested habitats with low snow depths.

Special Needs
Mountain goat can travel several kilometres through mature forest from escape terrain to access mineral licks particularly in the spring and summer to restore minerals depleted through the winter and lambing periods or to obtain minerals not found in their forage (http://ilmbwww.gov.bc.ca/slrp/srmp/north/kispiox/reference_material/Mahon_2003). The trails and the licks are key site specific habitats, which are important to mountain goats, but the distribution in the plan area is poorly known.

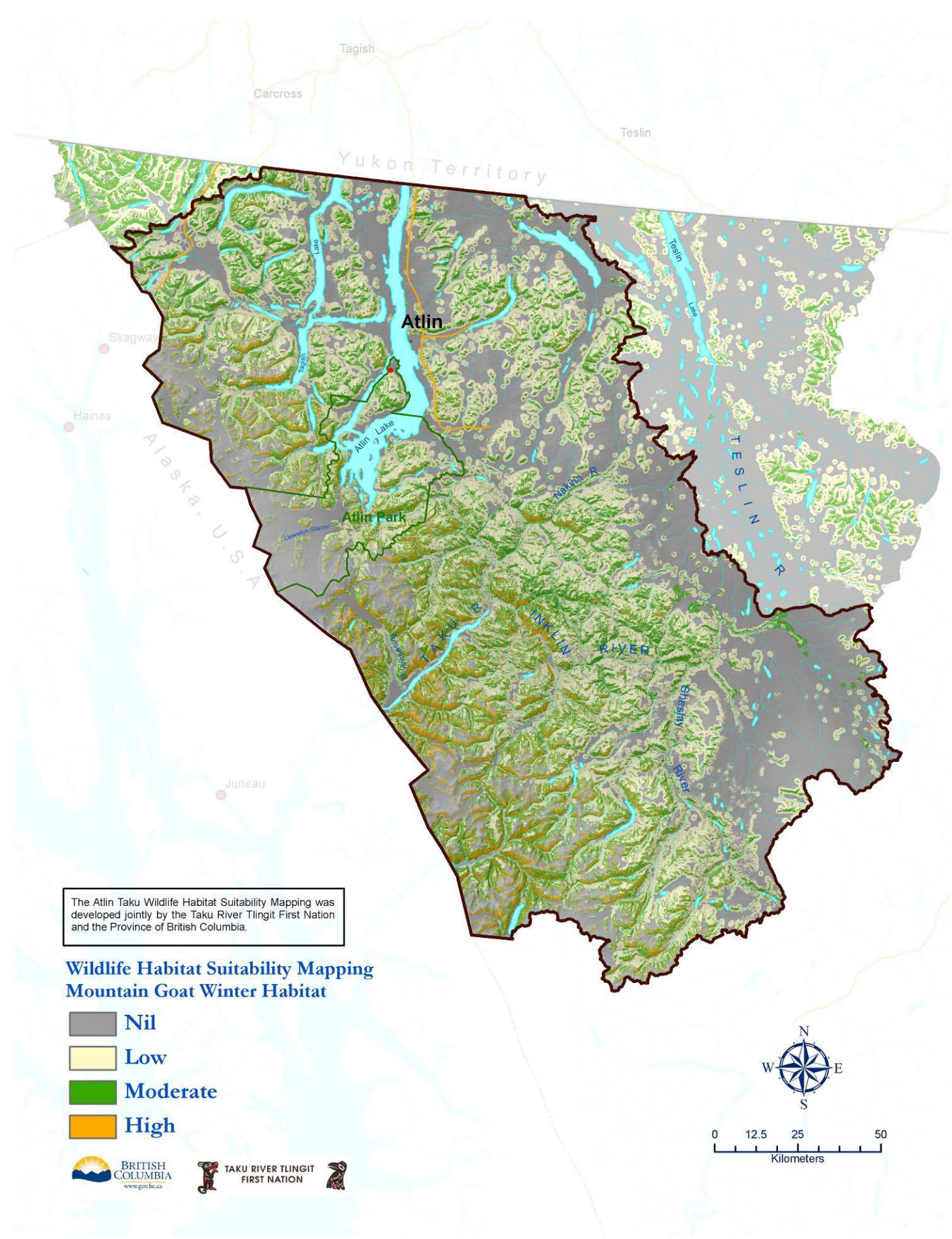
Escape terrain habitats are steep, rugged, cliffs and rocky outcrops within a distance to foraging habitats or low snow areas (e.g. windswept ridges). Mountain goat will move to escape terrain

when alarmed and to avoid predation. Escape terrain used by mountain goat has been described as slopes > 30 degrees and < 90 degrees (Hawkes 2003 and Heinemeyer *et al.* 2003). Escape terrain is a critical habitat for mountain goat and mountain goats have shown a fidelity to the terrain. In winter, mountain goats have been documented to stay within 150 metres to 300 metres of escape terrain, with a similar fidelity to escape terrain during lambing. In summer, there is fidelity to escape terrain but it is expected mountain goats will periodically use habitats at greater distances than 300 m including travel to licks.

MAP 26: Mountain Goat Summer Habitat



MAP 26: Mountain Goat Winter Habitat



Moose (Map 28 Summer Habitat & Map 29 Winter Habitat)

Moose are found throughout the plan area in coastal, transitional, and boreal ecosystems. Their food sources and habitat use is similar between ecosystems with the main difference the restriction to habitats from snow depths. The coastal and transitional ecosystems have significantly more snow than the interior boreal ecosystems. This results in higher snow depths earlier in the winter and moose will move from upper elevation habitats and transitional ecosystems to lower elevation coastal floodplain habitats and mature tall coniferous stands close to foraging areas (dense tall shrubs) to have easier access to forage and reduced constraints from snow. In the boreal/interior ecosystems, moose may use upper and lower elevation habitats all winter if the snow depths are below average, but generally by January moose will be using low elevation foraging habitats close to tall coniferous stands for snow interception.

Life History
Moose are considered solitary animals that move within familiar summer and winter home ranges. Moose often have seasonal home ranges within a larger annual home range or migrate between lower elevation winter and calving areas to upper elevation summer and rutting areas. It is during the late summer when groups of moose are often seen in upper elevation lakes foraging on aquatic vegetation and during the rut where moose can also be seen in groups.

In the plan area, moose rut in the fall with the peak in late September and early October. Often groups of moose are found near treeline in shrub communities with islands of coniferous trees; however moose will travel to lower elevation habitats to rut if animals are present. During winter, moose generally move to lower elevation forested habitats as the snow depth increases and usually by late May to early June, after a gestation period of eight months, moose cows will calve. Usually a single calf is born but twins commonly occur to 10 – 20 percent of cows. Calving habitats can include islands, marshes or swamps, burns, or patches of dense mature-old forest stands. It is believed the cows are using these habitats to hide and protect their calves from predators.

Moose use a variety of habitats primarily in a combination of early successional areas including burns, riparian or floodplain habitats, and mature coniferous stands for forage, snow interception, thermal relief, and for protection. In addition the movement to upper elevation habitats provides thermal relief and protection. In winter, floodplain habitats can be important if the snow depth restricts access to open or upper elevation foraging habitats.

Seasonal Habitats
The TRTFN TIEK descriptions of seasonal habitats for moose were summarized in Heinemeyer *et al.* (2003) as:

> *'...moose as closely associated with habitats that support lush willow growth, as well as other shrubby and herbaceous plants that they forage upon. Wetland habitats, including marshes, river sloughs and "weedy" lakes are used heavily, as are higher elevation (subalpine and alpine) willow patches. Burns and other open, shrubby habitats were identified as important for moose. Moose use forest cover throughout the year, but particularly during fall rutting for protection, and during the winter to escape deep snows...*
> *...During winter, moose will use high elevation shrubby habitats until the snow drives them out. Through mid-winter and spring, low elevation habitats are important, including wetland associations and other open, shrubby habitats at lower elevations. Additionally, low elevation forests provide snow interception in the winter. Over the summer and through the fall, moose expand their habitat use to a wider diversity*

of habitats, including high elevation, shrubby habitats in alpine and subalpine areas, open slopes and burns. During this time, some moose continue to use low elevation, aquatic habitats. Security and thermal habitats are important throughout the year, but particularly during fall and winter, when moose can be found close to forest cover or within forests at treeline or low elevation valley bottoms.'

The seasonal habitat relationship occurs at varying intensity in the plan area with coastal and transitional ecosystems having a significantly higher snow load than the boreal ecosystems. Hawkes and Maclean (2003) describe this difference in habitat use by ecosection found in the plan area as

"…The Teslin Plateau (TEP) is located in the Boreal Mountains and Plateaus ecoregion and has flat to gently rolling upland surfaces that are separated into large isolated blocks by the forested valleys of Atlin Lake, Surprise Lake, Tagish Lake and the Taku River and its tributaries. The ecosection has a dry, subarctic climate and is within a distinct rainshadow relative to the Coast Mountains. In this ecosection moose are expected to use habitats in all Biogeoclimatic Zones in the Teslin Plateau ecosection. The Tahltan Highlands ecosection (THH) is one of three ecosections that lie within the Yukon-Stikine Highlands ecoregion. This ecoregion is a transitional mountain area lying between the rugged coastal mountains to the west and the subdued plateaus to the east (Teslin Plateau ecosection, Boreal Mountains and Plateaus ecoregion). The Tahltan Highlands ecosection is a transitional mountain area with several large valleys exposed to the coast that allow moist air to dominate the lower slopes. Within the project area, the upper part of the Taku River, the Inklin River, Sloko River and Nakonake River occur within the Tahltan Highlands Ecosection. Moose are expected to use lower elevation habitats in Biogeoclimatic Zones in the Tahltan Highlands ecosection. The Boundary Ranges ecosection (BOR) is found in the Northern Coastal Mountains ecoregion. The area is best characterized as rugged coastal mountains (Coast Plutonic Complex) dissected by several large, low elevation coastal river valleys with wide, braided channels and extensive floodplains (Taku, Whiting, Stikine, Iskut, Unuk). In this ecosection moose are expected to use lower elevation habitats (particularly floodplain habitats) in Biogeoclimatic Zones in the Boundary Ranges ecosection."

This difference in seasonal habitat use and snow load has resulted in moose habitat use being reported separately for boreal and coastal/transitional ecosystems.

Forage

Food habits of moose vary considerably, but are characterized in general by extensive use of early successional woody browse, such as early stages of regrowth following disturbances created by fire, flooding, logging, clearing, and other disturbances.

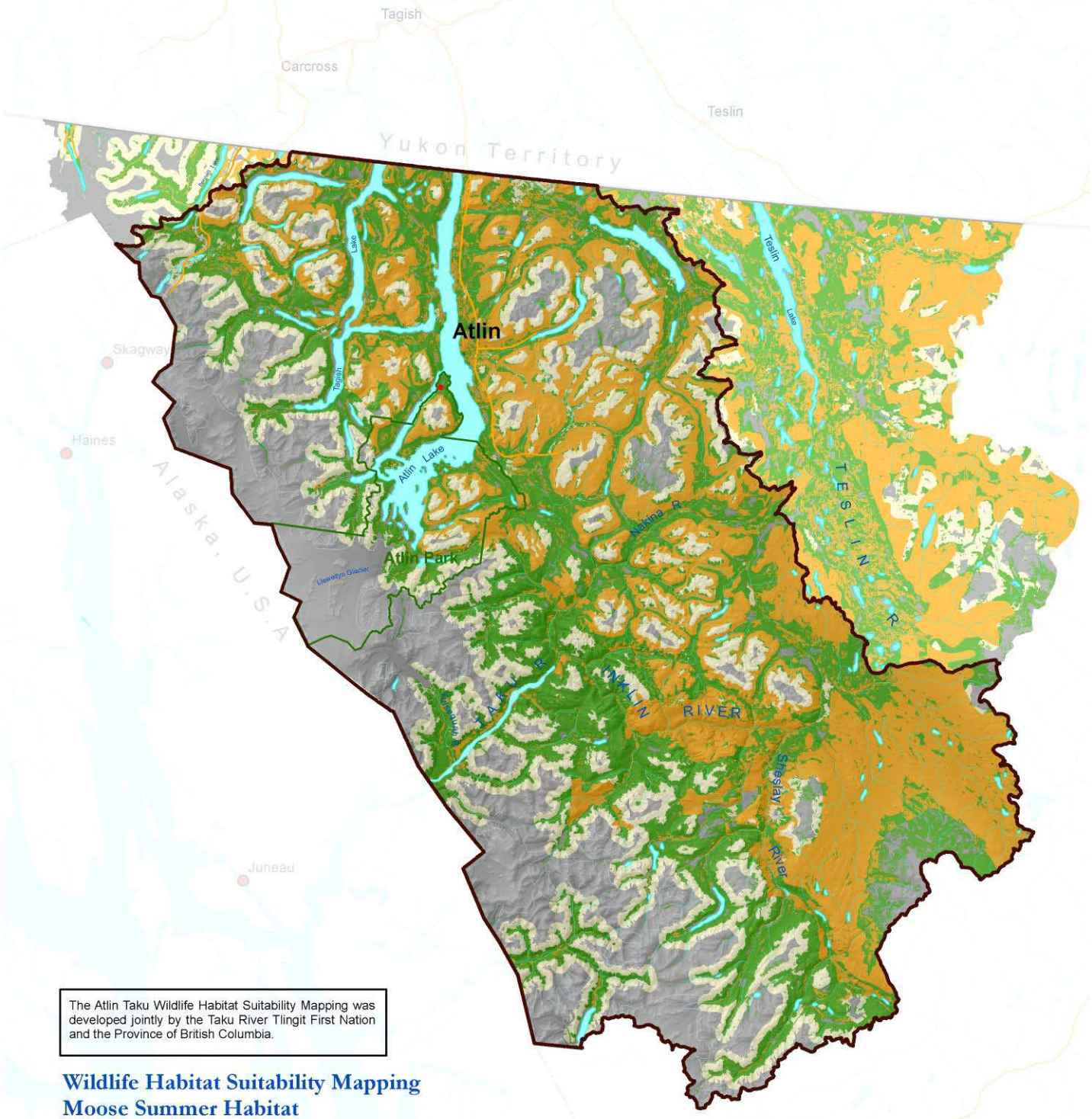
Moose depend primarily on dense thickets of willows for winter food but red-osier dogwood, cottonwood, paper birch, aspen, high-bush cranberry, false box, and subalpine fir are also important foods found in the plan area. Moose will also strip bark from willows and poplars in winter when forage is limited.

In summer, moose will eat the new leaves of shrubs as they emerge and aquatic plants like horsetail, burweed, and submerged pondweeds are important foods. In addition, soft tips of twigs, forbs, mushrooms, grasses, lichens, low bush cranberry and other shrubs, including red-osier dogwood, willow, and aspen are foraged by moose.

Special Needs

Moose are considered a generalist in habitat use and do not have specific habitat uses like escape terrain. For this model, no special needs were identified.

MAP 28: Moose Summer Habitat



The Atlin Taku Wildlife Habitat Suitability Mapping was developed jointly by the Taku River Tlingit First Nation and the Province of British Columbia.

Wildlife Habitat Suitability Mapping
Moose Summer Habitat

- Nil
- Low
- Moderate
- High

BRITISH COLUMBIA
www.gov.bc.ca

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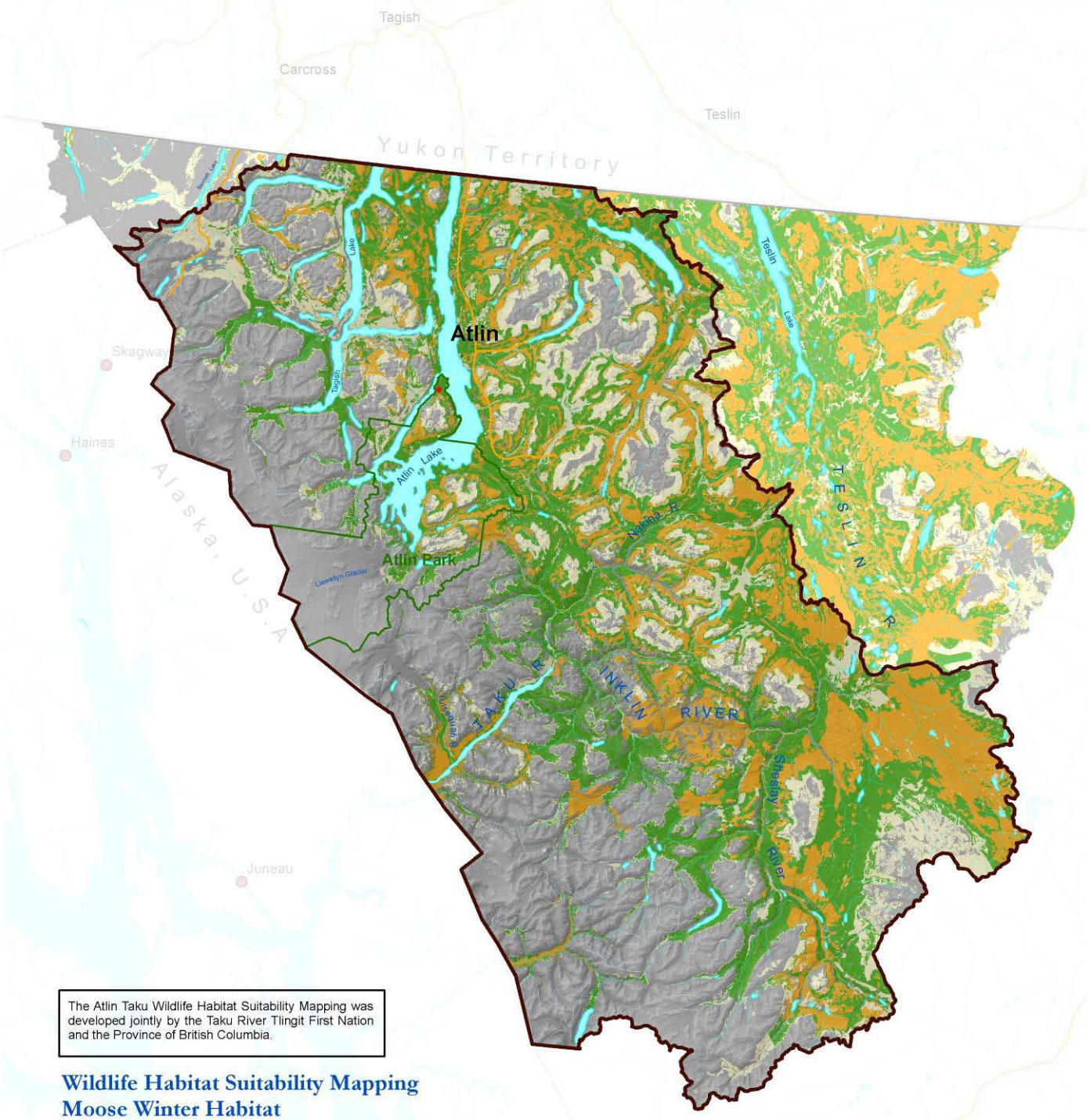
MAP 29: Moose Winter Habitat



Woodland Caribou (Map 30 Summer Habitat & Map 31 Winter Habitat)

Woodland caribou are found in the boreal ecosystems of the plan area. Currently four herds have all or part of their range in the plan area. The Carcross/Squanga, Atlin, Swan Lake, and Level Mountain- Kawdy Plateau herds have seasonal ranges in the area. The Carcross and Atlin herds range from Gladys Lake to west of Tagish Lake, and north from O'Donnell River to the Yukon Territory. Swan Lake caribou are found east of Teslin Lake to the headwaters of the Little Rancheria River and north from Parallel creek to Yukon Territory. Level Mountain – Kawdy Plateau herd ranges between the plateau and mountain in the southeast portion of the plan area.

Life History
Woodland caribou in the plan area are considered part of the 36 herds comprising the Northern Mountain Woodland Caribou Population which are designated as a *Special Concern* by the federal government under the *Species at Risk Act* (SARA). Currently a management plan is being developed by First Nations, provincial, territorial, and federal governments and a draft is planned to be released in 2008.

Caribou in the plan area are also considered the northern ecotype of woodland caribou, which means caribou in small groups will migrate in the spring from low elevation forested winter habitats to alpine ranges for calving, summer, and rutting seasons. The rut occurs in mid October with large groups of caribou found in alpine benches and subalpine shrub habitats. Once the snow depth becomes restrictive to caribou, small groups of caribou will migrate to lower elevation forested habitats. Caribou will also use windswept alpine areas during winter when snow depth becomes restrictive.

Caribou need large patches of contiguous forest to avoid predators. Predators are avoided by being in small groups and dispersed across large patches of mature and old pine forests. This strategy can reduce the potential for interaction with wolves. Woodland caribou forage primarily on terrestrial lichen and will select lodgepole pine/lichen habitats with low snow depths to access lichen. Caribou often concentrate in winter ranges which are located in rain shadows. These areas have lower precipitation and have conditions for lichen growth. Lakes and swamps are used by caribou possibly as a way to see predators and then move into the forest to avoid them, and it is thought some lakes or swamps have overflow which may be a mineral source for caribou in the winter.

After a gestation period of seven to eight months, calves are born from late May to early June, usually in the alpine at high elevations. The use of subalpine habitats and islands are used by some herds in B.C. to avoid predators; however for the herds in the plan area it is thought females will travel and disperse across large areas in high elevation alpine habitats to calve. It is considered a predator avoidance strategy. After several days, females and calves will form into small groups and summer in the alpine range feeding on shrubs, lichens and emerging vegetation. Bulls and females without calves travel to alpine ranges in the spring but are often at lower elevations in the alpine and subalpine during calving. During summer, small groups of bulls, cows with and without calves, can be found in alpine and subalpine habitats.

Seasonal Habitats
The TRTFN TIEK descriptions of seasonal habitats for woodland caribou were summarized in Heinemeyer *et al.* (2003):

> *'These herds rely upon low-elevation mature pine forests in the winter, and use a range of high elevation alpine and subalpine habitats in the summer. Lichens are the critical winter food source for caribou; because lichen are very slow growing, the highest densities of lichen are associated with older pine forests. In years when snow conditions make cratering difficult or unproductive, the caribou may move to high elevation, open habitats that have been wind-cleared of snow.'*

This is similar to seasonal habitats described by MacLean (2003) where the use of open low elevation lodgepole pine forests in the winter and the use of alpine habitats in both summer and winter (in both low and high snow loads winters) occurs throughout the herd's range.

Forage

Caribou predominantly forage, by cratering through snow, on terrestrial lichens (*Cladonia* spp. and *Cladina* spp.*),* which can comprise over 70% of the winter diet. In addition, arboreal lichen found in black spruce sedge fens or other wetlands can be an additional food source in winter (MacLean 2003).

MacLean (2003) describes spring and summer forage sources for woodland caribou as:

> *'Caribou will feed in bogs, riparian areas, and open meadows as the vegetation begins to emerge (Hatler 1986). Caribou will also make use of south facing deciduous slopes and meadows as they migrate from winter range as these areas become snow free earlier than other areas (Wood, 1996). Terry and Wood (1999) also noted caribou use in younger seral lodgepole pine, and mixed pine aspen stands in spring... ...Summer diet for woodland caribou is not well documented but is thought to be more diverse than in winter and consists of forbs, deciduous leaves, lichens, fungi, grasses, and sedges. In the Kluane Range in Yukon Territory, Oosenbrug and Theberge (1980) reported that caribou selected for birch-sedge meadows, sedge meadow communities, and habitats with high sedge component. Willows and other shrubs were used by caribou in summer.'*

Special Needs

In winter, caribou need patches of pine/lichen forests for feeding and predator avoidance and in summer windswept ridges and permanent snow/ice patches are important for thermal and insect relief.

Eskers are found in the Atlin East Herd range and are used by woodland caribou in both summer and winter seasons. Unfortunately, the mapping is not at a fine enough scale to capture these features. Eskers will need to be considered through the planning process for management recommendations.

As mentioned, lakes are an important winter habitat for woodland caribou; however, it was not possible to rate the lakes and still show them as a waterbody on the maps. It was decided to indicate waterbodies within known winter ranges for caribou management. For example, waterbodies located between Atlin Lake in the west, Gladys Lake and river in the east, the British Columbia/Yukon border in the north are used by woodland caribou in the winter.

Waterbodies within woodland caribou winter range should be considered as high value habitats when considering management recommendations.

MAP 30: Woodland Caribou Summer Habitat

MAP 31: Woodland Caribou Winter Habitat

Grizzly Bear (Map 32 Spring, Map 33 Summer & Map 34 Fall Habitat)

Grizzly bear are found throughout the plan area with bears generally using salmon or boreal ecosystems. This does not mean bears do not move between ecosystems, but is a way to define the differing habitats and their use by bears.

Salmon ecosystem watersheds are defined by major watersheds in the plan area with summer and fall salmon runs. The major watersheds include the Nakina River, Inklin River, Nahlin River, Sheslay River, and Barrington River watersheds. Salmon runs are a major influence on grizzly bear habitat use in these watersheds, but the emergence of vegetation, the ripening of berries, and spring predation on neonatal (newborn) ungulates are a strong influence on habitat use by bears in the area.

Boreal ecosystem watersheds are defined as the major watersheds in the plan area north of the salmon watersheds where salmon is unavailable. The major watersheds include Kusawa River, Tutshi River, Atlin Lake, Gladys Lake, Teslin River, Jennings River, and Swift River watersheds. Habitat use is based on the emergence of vegetation across elevations, access to berries, and access to protein sources such as ants, ground squirrels and marmots, neonatal ungulates, and carrion from natural mortality and hunting.
In addition to considering grizzly bear habitats by boreal and salmon watersheds is the understanding of grizzly bear ecology by ecosection.

The Boundary Range (see description in the moose section for the topography and climate for the ecosection), as a coastal ecosection, provides possibly the highest abundance and diversity of food plants and salmon for all seasons for grizzly bears in the plan area.

Similarly the Tahltan Highland has grizzly bears having access to salmon, mammals, and a diversity of food plants though lower than the coast but greater than the interior.

The Teslin Plateau is drier than the other ecosections, and while important food plants such as crowberry and horsetail can be locally abundant, the overall diversity is lower than the other ecosections. Animal protein is accessible by scavenging on carrion, preying on ungulate young or ground squirrel colonies, but it is expected to be more difficult to acquire than compared to salmon habitats.

Both approaches indicate where salmon play a larger role in influencing summer and fall habitat use in the coastal and transitional ecosystems than boreal ecosystems and both approaches can be used to classify and seasonal suitability habitat ratings for the plan area.

Life History
Grizzly bears are mostly solitary omnivores that typically have large seasonal and annual home ranges. Grizzly bears exhibit aggression between sexes and age classes with large males being dominant. Grizzly bear have slow reproductive rates with females' first breeding at five or six years of age, with a three year interval between cubs. Offspring remain with their mothers for 26-28 months. Home ranges of males are large and can overlap several females' home ranges. Related females may have overlapping home ranges but otherwise female home ranges have limited overlap. Males have limited overlapping of home ranges.

For grizzly bears, vegetation such as grasses, herbs, roots, and berries can comprise 60 to 90 percent of their diet but they are opportunistic and will seek protein when available such as

carrion, young ungulates, or salmon. There is some variation on the feeding patterns between seasons and between salmon/coastal and boreal/interior bears.

The provincial species account for grizzly bears describes these patterns as (http://www.env.gov.bc.ca/wildlife/whr/provincialex.html):

> *'..Some variation occurs in the feeding patterns between coastal and interior grizzly bears. On the coast, beginning in the spring, grizzly bears feed on early green vegetation such as skunk cabbage and sedges located in the estuaries and seepage sites that become snow-free first. As the season advances, the bears follow the receding snow up the avalanche chutes feeding on emerging vegetation and roots. Ripe berries attract the grizzlies down onto the floodplain and sidehills where they eat devil's club, salmonberry, raspberry, black twinberry, elderberry, and a variety of blueberries. They begin to feed on salmon as they become available in the spawning channels and continue to do so until late fall, feeding on live and eventually dead salmon. Once salmon supplies dwindle, grizzlies return to feeding on skunk cabbage and other vegetation. In the interior, beginning in the spring, grizzlies feed mainly on the roots of hedysarum and carrion, and opportunistically prey on winter-weakened ungulates. As the green vegetation emerges the bears begin to graze on grasses, horsetails, rushes and sedges. During this time, they also prey on ungulates on their calving grounds. In the berry season they feed almost exclusively on buffalo berries, blueberries, and huckleberries. Fall feeding focuses mainly on the roots of hedysarum once again. Throughout the active season, interior grizzlies will prey on small mammals, especially ground squirrels. Both coastal and interior grizzlies will feed on insects and grubs when the opportunity arises. (MELP 1994).'*

For coastal bears, denning and hibernation occur from early November to April and interior bears usually den from October to May. Hibernating habitats are thought to be sloped, with dry, stable soil conditions that remain frozen during the winter. While the denning elevation varies by region, the dens usually are on well-drained slopes that capture persistent snow cover to provide insulation.

Seasonal and Foraging Habitats

For the plan area, information on denning habitats across all ecosystems is poorly known, but some dens were identified in the Tahltan Highland (THH) and Teslin Plateau (TEP) Ecosections (K. Diemert personal communication). In 2001 and 2002, seven dens were investigated in the THH, and the dens were found between 540 m and 1505 m elevation. Two dens were investigated in the TEP in 2001 both were over 1200 m elevation.

Even with this information, habitat use by bears was only considered for the spring, summer, and fall periods for the plan area because it was felt not enough information was available for grizzly bears in early spring when first emerging from the den and in late fall when preparing to den.

Seasonal feeding patterns and foraging habitats were combined for this species to explain how forage is influencing habitat use by bears.

Habitat models for grizzly bears in the plan area described seasonal habitats with similar patterns where bears after leaving the den are seeking carrion, such winter killed ungulates in the boreal/ interior and scavenging on over-wintered salmon carcasses in salmon watersheds. In addition, bears are using warm aspect, snow free slopes (particularly avalanche chutes) for early growing plants. Bears in coastal/transitional ecosystems will use river floodplains to forage on new growth (e.g. sedges) at lower elevations as well as scavenging. Bears will follow the plant

phenology (green up) as it moves from lower elevations to higher sub-alpine and alpine habitats throughout the plan area (Heinemeyer et al. 2003, Wellwood 2003a).

Another source of spring forage includes the predation on new born ungulates, including mountain goat, woodland caribou, Stone's sheep, and moose. Both models in the plan area recognize the importance of the young ungulates as an important protein source, but were not included due to difficulties interpreting it; however, a recent review of the Adanac project in the plan area has considered grizzly bear protein sources (K. Diemert personal communication).

In the summer, bears will forage on a diversity of forbs and berries as well as seek protein such as spawning salmon in salmon watersheds and insects in boreal watersheds. In salmon watersheds, salmon producing rivers provide a high value source of protein for bears, but berry producing habitats and other plant forage habitats are important for bears. Both species accounts for the plan area indicate the evidence of females with cubs, and subadults may avoid bear salmon habitats to avoid aggressive males (Heinemeyer et al. 2003, Wellwood 2003a).

In the fall, bears are still using habitats along salmon producing rivers to access fish protein, and alternate forage habitats that contain berries, roots, or forbs are still important by females with cubs. In boreal ecosystems, grizzly bears will be foraging in habitats with late berries, roots, and forbs, and also habitats with colonies of ground squirrels, marmots or habitats with insects.

Special Needs

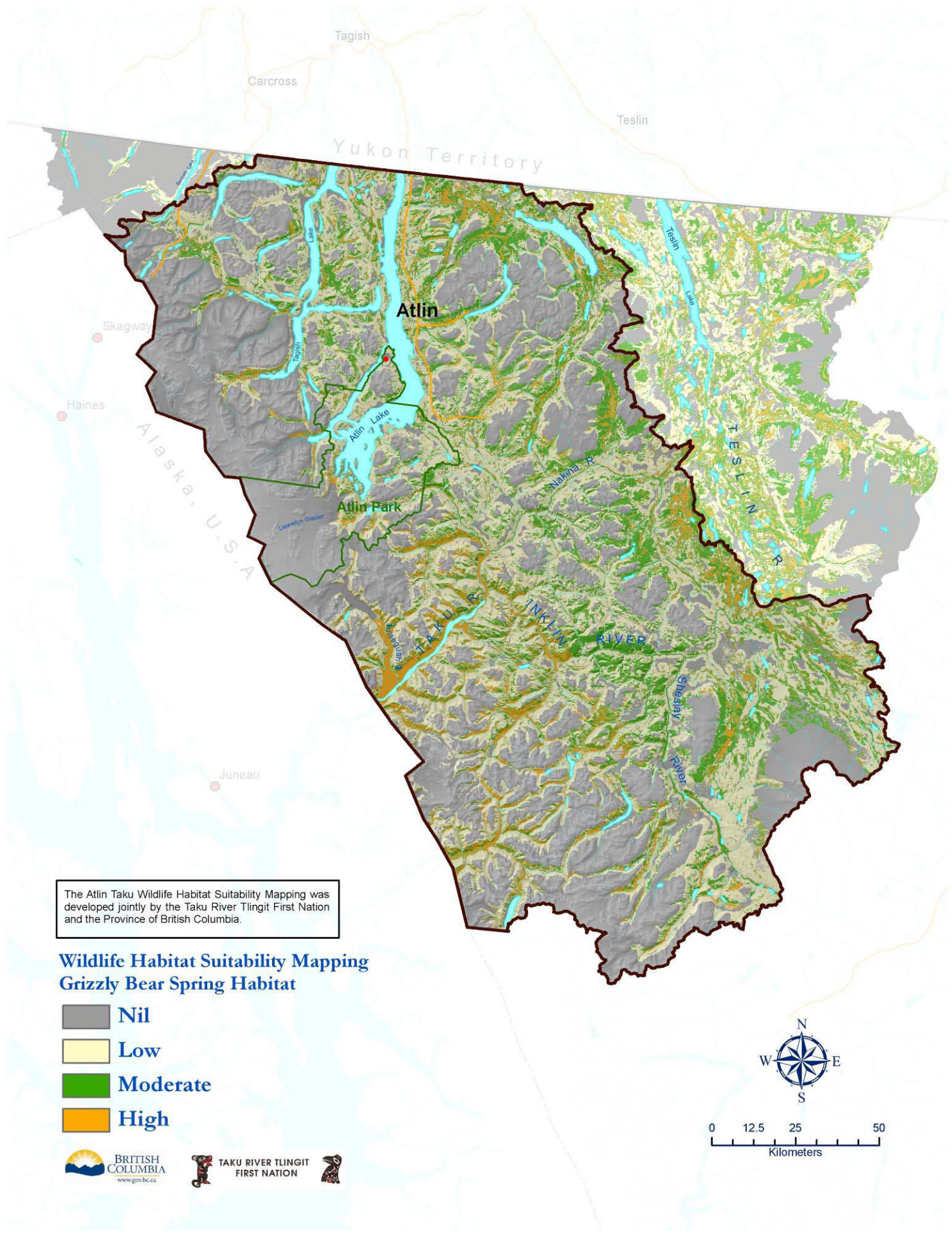
The importance of burns for grizzly bears was considered where burns can contain high value habitats with berries, insects, shrubs, and forbs up to 45 years.

Grizzly bear use site specific habitats such as avalanche chutes, river corridors, salmon runs, and small patch habitats like open alpine with crowberries, sedge fens or skunk cabbage. While it is possible to model for some attributes like river corridors and salmon spawning areas, small patch habitats are difficult to model with the existing information; however, management for these habitats should be included when considering land use choices in grizzly bear habitats.

Wellwood (2003a) reports the following on grizzly bear foraging needs in relation to scale:

> *…'Grizzly bears require a diversity of habitats within their home range that provide an abundant supply of forbs and mammal food resources (Mealey 1980) that can be sporadic in space and time (Knight 1980). Bear habitat selection is strongly related to the seasonal availability of important food plants (Stelmock and Dean 1986, Phillips 1987, MacHutchon et al. 1993) where the digestive constraints of bears appear to influence the selection of habitats with succulent forage (Hamilton and Bunnell 1983). Waller and Mace (1997) suggest, "bear foods occur in relatively small microsites within broad cover types. This patchy distribution of foods, combined with the grizzly bear's capacity for learning and tradition, make modeling difficult."*

MAP 32: Grizzly Bear Spring Habitat



The Atlin Taku Wildlife Habitat Suitability Mapping was developed jointly by the Taku River Tlingit First Nation and the Province of British Columbia.

Wildlife Habitat Suitability Mapping
Grizzly Bear Spring Habitat

- Nil
- Low
- Moderate
- High

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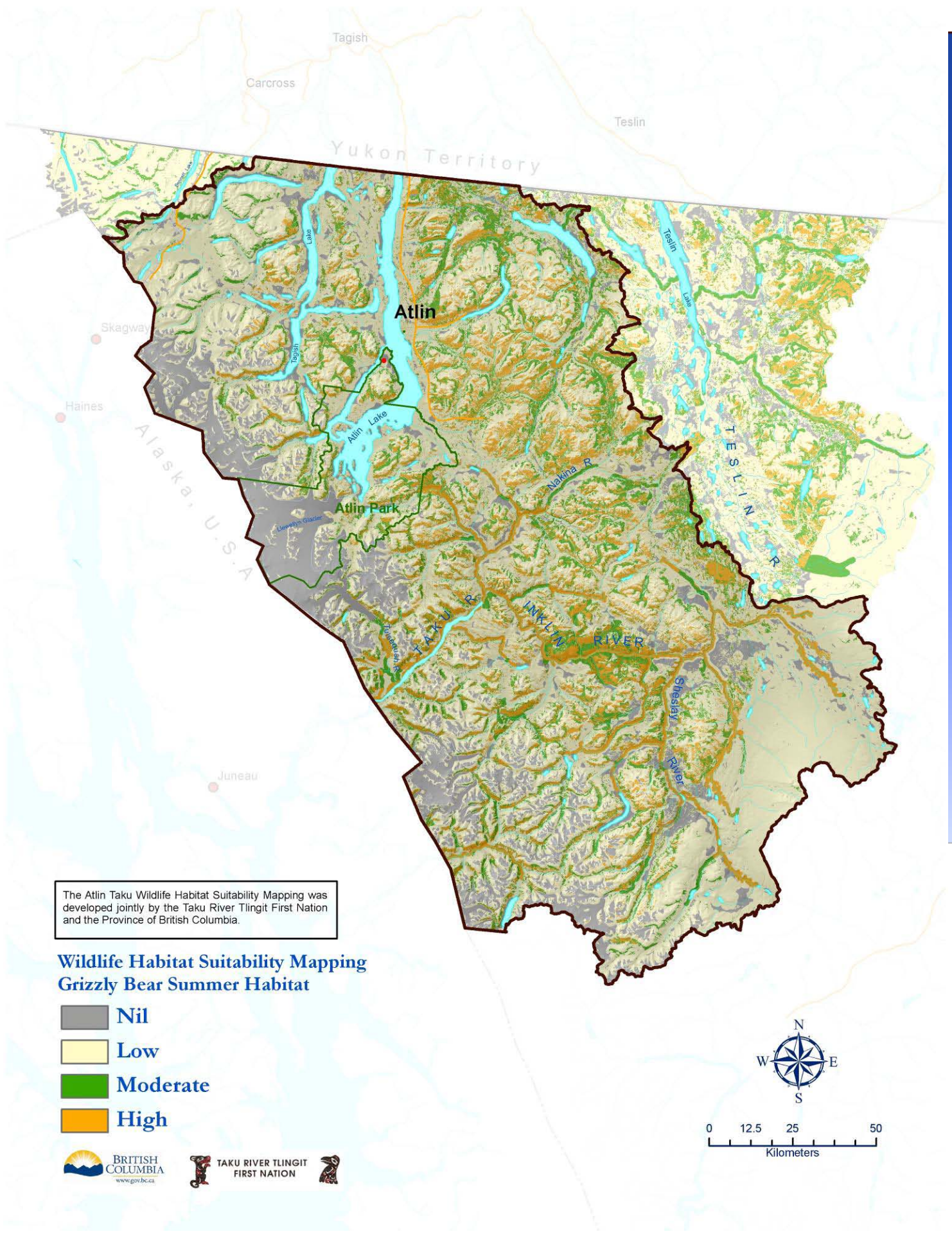
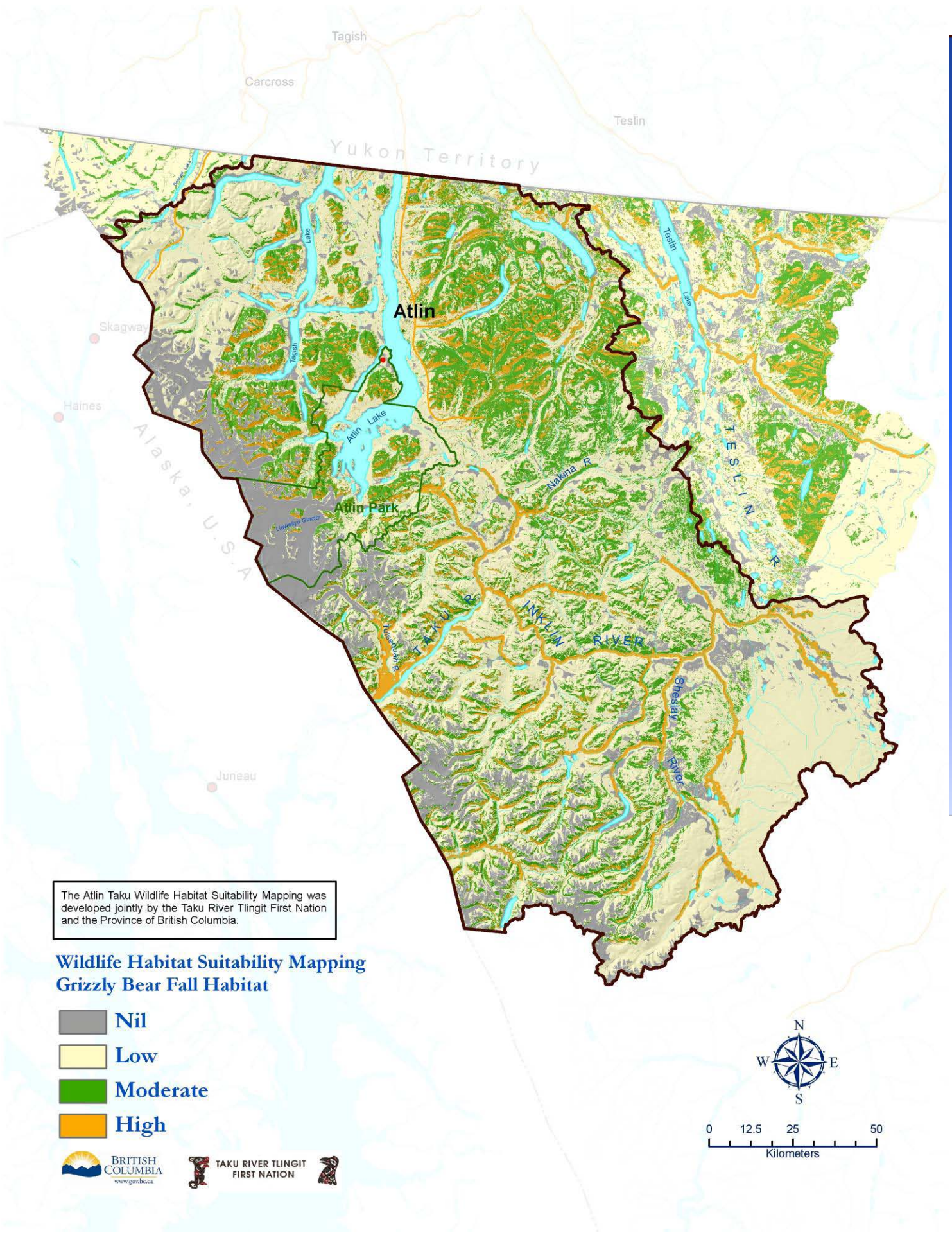
TAKU RIVER TLINGIT FIRST NATION

MAP 33: Grizzly Bear Summer Habitat



MAP 34: Grizzly Bear Fall Habitat



APPENDIX A – TYPES OF MAP INFORMATION

Maps are an effective way of presenting information for land use discussions, allowing a ready visual interpretation of the spatial location of resource data. Maps for regional scale planning are normally produced at a small scale (1:250 000). At a scale of 1:250 000, the area of one square centimetre equals 625 ha on the ground (or 2.5 km by 2.5 km). The amount of information that can be shown at this scale is limited, but the scale is adequate for identifying regional patterns of land and resource use. It may be useful for participants to keep in mind that, while information may occasionally need to be assessed at a more detailed scale, strategic planning over a large area requires a relatively small scale of mapping. It would not be possible to cope with the large amount of maps and information at a more detailed or larger scale.

There are two types of maps that have been developed:

- descriptive maps; and,
- interpretive maps.

Both types of maps are included in this handbook.

Descriptive Maps

Descriptive maps provide an overview of primary characteristics or features of a resource or activity. The maps are based directly on data from inventories that have been collected using defined methods and standards. In essence, these maps show 'what is there' and are value-neutral. Descriptive maps include:

- base map information, including primary geographical features such as rivers, streams lakes, and topography.
- legal and tenure information including administrative information such as private property, municipal boundaries, Indian reserves and various tenures for agriculture, mines, forests etc.
- biophysical features such as vegetation, fish streams, bird colonies; and,
- human uses and activities such as roads, cut-blocks, mine sites, or areas of recreation use.

While descriptive maps are supposed to describe 'what is there' there is still a reliability issue. For example, while vegetation maps are described as descriptive maps because they summarize the vegetation that exists on the ground, the maps are based on air photo interpretation at varying scales (usually 1:10 000 to 1:20 000 range). Ground checks are completed on only a percentage of the polygons of the final vegetation map. This means that the reliability of the map depends in part upon the skill of the individuals who are doing the air photo interpretation. To produce a map that is accurate in all details would require that it have a source scale of 1:1, i.e. in the case of vegetation maps that all information came from ground checks. This is impossible when completing inventories across vast areas such as the planning area.

Interpretive Maps

Interpretive maps involve some kind of assessment of how significant an area's resource values are. Different types of interpretive maps developed by government ministries include:

- suitability maps;
- significance maps; and,
- resource potential maps.

Interpretive maps take various layers of descriptive information and combine them or apply formulae to them in GIS to assess the potential of an area for a particular use e.g., suitability mapping for wildlife habitat. This type of mapping is based on a number of assumptions, which should be clearly stated along with the method of derivation. Ideally, this type of mapping is followed up with some kind of field verification to test that the assumptions used to develop the map were correct.

Interpretive mapping can be used to derive the following types of resource information:

- Physical e.g., soil capability for agriculture, mineral potential;
- Biological e.g., wildlife habitat suitability, biogeoclimatic zones/ subzones/ variants; and a fish stream map based on interpretations of stream gradient.

Reliability of Map Information

The quality of data that goes into maps may be coarse or detailed, depending on the method of data gathering. The level of detail that goes into gathering the data used in a map will generally affect its reliability. For example, data may be gathered over a small scale, such as 1:500 000 with little detail and little or no field verification. Any maps produced from this data will likely have a lower level of reliability than maps prepared using data gathered over a large scale, such as 1:10 000 with extensive field sampling.

The age of data also affects its reliability. Some inventories will remain relatively constant over time (e.g., bedrock geology), while others will be subject to ongoing change and will therefore become less reliable the older the data. In addition, as techniques and technology improve over time, so will the reliability of the product data.

Of course, more reliable information is always preferable, but is not always essential to a land use planning process. With discussion of issues at the sub-regional scale, it is generally adequate to use a more coarse level of information while providing sufficient flexibility and direction to lower levels of planning to refine management as more detailed information becomes available.

Local Knowledge

Local knowledge can enhance the information base available to the planning table, verifying information provided by government or adding new information. The Government Technical Team acknowledges the knowledge of local residents and resource users and welcomes feedback on map information, including apparent gaps or errors.

Dealing with Uncertainty

The maps included in this atlas have been prepared using the best information available at the time planning was underway. As always, there will be gaps in the information available. Critical information gaps were identified in the early stages of preparation for planning and some inventories were undertaken to fill those gaps.

Strategic level planning concerns values over broad areas. Flexibility can and should be built into the final plan to allow refinement of management approaches when more detailed planning is required.
The information base is continuously being expanded as new inventories are completed and as new technologies become available for gathering and assessing information. In addition, our collective understanding of effective management of land and resources changes over time.