Appendix 13-B

Murray River Project: Wildlife Habitat Ratings Study Final Report

MURRAY RIVER COAL PROJECT

Application for an Environmental Assessment Certificate / Environmental Impact Statement

MURRAY RIVER PROJECT
WILDLIFE HABITAT RATINGS STUDY
FINAL REPORT

PREPARED FOR:

HD MINING INTERNATIONAL LTD.
SUITE 433 595 BURRARD STREET
P.O. BOX 49161
VANCOUVER, BC
V7X 1J1

PREPARED BY:

EDI ENVIRONMENTAL DYNAMICS INC.
201-1110 6TH AVENUE
PRINCE GEORGE, BC V2L 3M6
250.562.5412

EDI CONTACT:

RANDY MORRIS
640-1140 WEST PENDER STREET
VANCOUVER, BC V6E 4G1
604.633.1891

EDI PROJECT NO.:

PROJECT # 10-V-0427, 12-V-0073
DATE APRIL 1, 2012

2011 ENVIRONMENTAL EMPLOYER OF THE YEAR

EDI ENVIRONMENTAL DYNAMICS INC.

EXECUTIVE SUMMARY

Environmental Dynamics Inc. (EDI) on behalf of HD Mining International Ltd. (HD Mining) initiated a Wildlife Habitat Ratings (WHR) study for the Murray River Project (MRP) in the fall of 2010. Six terrestrial wildlife species were chosen for habitat rating: woodland caribou (*Rangifer tarandus caribou*), Black-throated Green Warbler (*Dendroica virens*), mountain goat (*Oreamnos americanus*), moose (*Alces alces*), grizzly bear (*Ursus arctos*) and fisher (*Martes pennanti*). Two components of field work were completed; the first phase occurred in October 2010 and the second phase in July 2011. Species-habitat models were developed including species accounts specific to the project area, Wildlife Habitat Suitability Ratings tables and a spatial representation of the ratings in a series of Habitat Suitability maps for each species. Wildlife Habitat Suitability Ratings were applied to all ecosystem units within the Predictive Ecosystem Mapping (PEM) project produced for the Murray River Project Regional Study Area (Rescan 2012). Each PEM ecosystem unit was described by a combination of the mapped biogeoclimatic unit, site series and structural stage. An interim report summarizing the first component of field work was produced in March 2011. Following the second field work phase, this final report summarizes Wildlife Habitat Suitability Ratings for the entire Regional Study Area (RSA).

ACKNOWLEDGEMENTS

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- Project management: Randy Morris, Glenn Wagner
- Project coordination and data analysis: Cathy Mackay, Sarah Atherton
- Field work: Sarah Atherton, Cathy Mackay, Jonathan St. Jean, Randy Morris, Ryan Desjarlais (West Moberly First Nations), Bruce Rogers (B.C. Ministry of Forests, Lands and Natural Resource Operations)
- Wildlife habitat ratings analysis & review: Sarah Atherton, Cathy Mackay, Anne MacLeod, Tim Antill
- Writers: Sarah Atherton, Cathy Mackay, Randy Morris, Jonathan St. Jean, Jennifer Greenwood, Debbi Weber, Anne MacLeod, Sam Barnes
- GIS & map production: Debbi Weber, Matt Power
- Data Management: Dennis Thideman
- Technical Review: Cathy Mackay, Mike Setterington, Randy Morris
- Species Account Review: Mark Phinney (Louisiana-Pacific Canada Ltd.), Dale Seip (Ministry of Environment) , R. Scott McNay (Wildlife Infometrics, Inc.), Lana Ciarniello (Aklak Wildlife Consulting)
- Information requests:
    - Mark Phinney (R.P.F., R.P.Bio., District Biologist, Louisiana-Pacific Canada Ltd.)
    - Bruce Rogers (M.Sc., R.P.Bio., A.Ag., Ecologist, B.C. Ministry of Forests, Lands and Natural Resource Operations)
    - British Columbia Breeding Bird Atlas[1]

AUTHORSHIP

This report was prepared by the EDI Environmental Dynamics Inc. EDI staff who contributed to this project includes:

Sarah Atherton, B.Sc., A.Ag. .... Primary Author

Cathy Mackay, M.Sc., R.P.Bio., P.Ag. .... Senior Review

[1] We thank the British Columbia Breeding Bird Atlas for supplying data. We would also like to thank the following partners in the Breeding Bird Atlas: Canadian Wildlife Service, British Columbia Ministry of Environment, BC Nature, BC Field Ornithologists, Biodiversity Centre for Wildlife Studies, Louisiana Pacific, and the Pacific Wildlife Foundation, as well as all of the volunteer participants who gathered data for that project.

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

HD Mining International Ltd. (HD Mining; formerly Canadian Dehua International Mines Group Inc.) is proceeding with environmental baseline studies for the Murray River Project (MRP), a proposed underground coal mine located approximately 12.5 km southwest of Tumbler Ridge, British Columbia. The project footprint, or Mine Surface Facilities Area, is expected to be approximately 235 ha with an actual disturbance area of 43 ha (Dehua 2010). The Local Study Area (LSA) and Wildlife Regional Study Area (RSA[2]) have been delineated to provide areas of focus for Environmental Assessment (EA) baseline data collection (Figure 1). The LSA (12,436 ha) extends 3 km north of the Project Site and 4 km southeast of the project site within the boundaries of the License Area. The License Area is the 16,024 ha area covered by the Murray River Coal Exploration license which includes a total of 57 coal licenses within the Peace River Coalfield (PRC) (Dehua 2010). The RSA is a watershed based boundary that encompasses all potential impacts to wildlife resources at the regional scale.

1.2 STUDY OBJECTIVES

The objectives of this study[3] are to:

- Develop wildlife habitat ratings, specifically suitability ratings, for the RSA of the Project to quantify the current habitat suitability for each of the six chosen wildlife species (woodland caribou, Black-throated Green Warbler, mountain goat, moose, grizzly bear and fisher);
- Develop species-habitat models for each species that are specific to the RSA and are based on current information;
- Apply wildlife habitat ratings to the most current Predictive Ecosystem Mapping (PEM) project (Rescan 2012) available; and
- Identify limitations of this study and provide recommendations for further wildlife work that will assist in effects analysis, mitigation planning, and monitoring through the complete life cycle of the Project.

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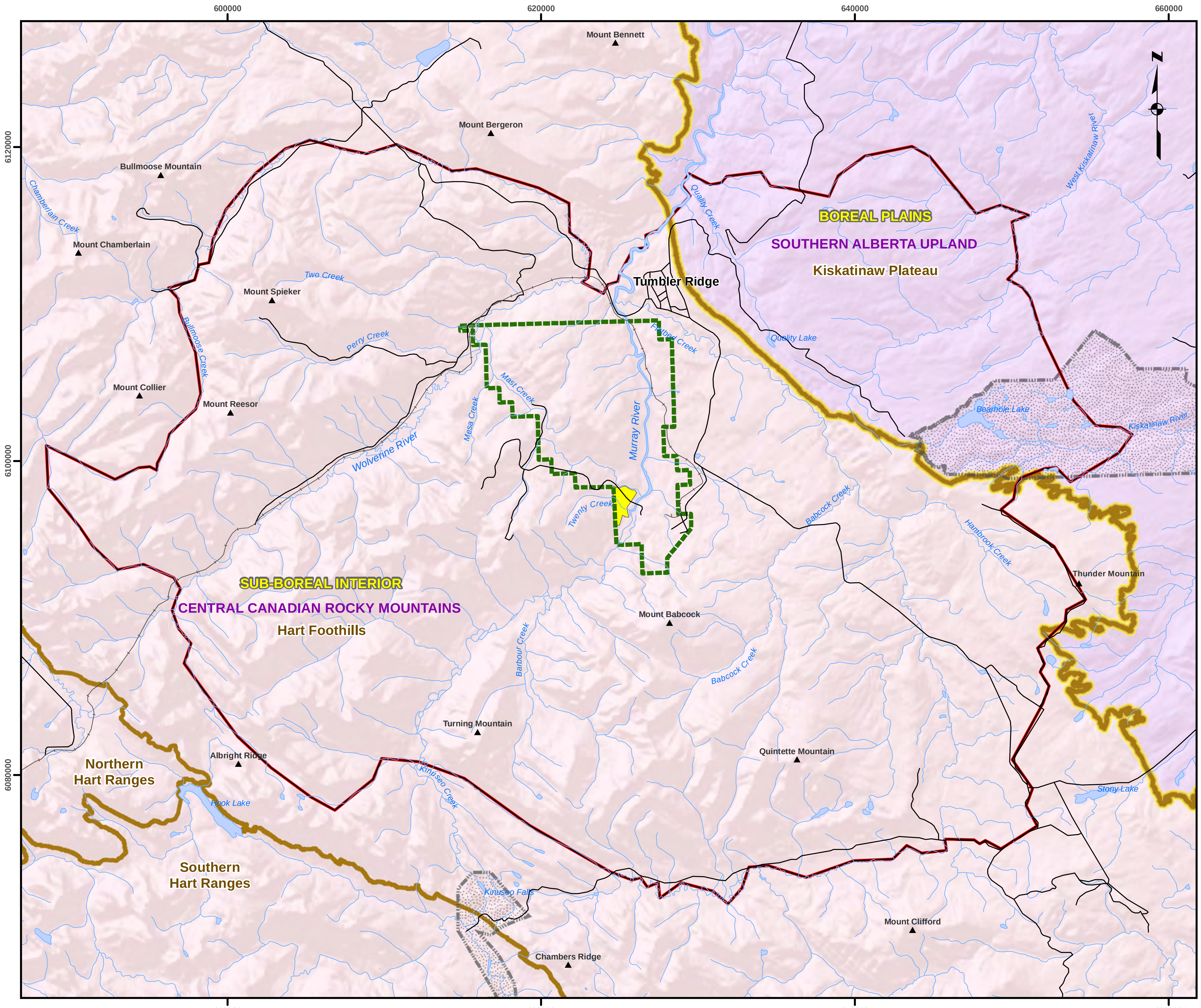
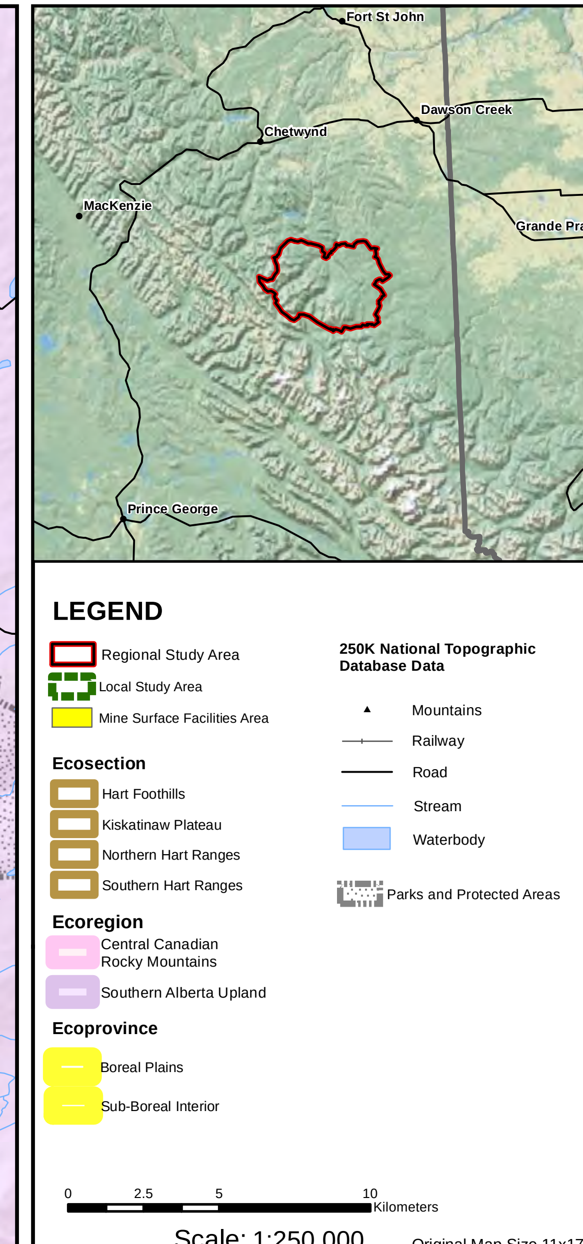
[2] The Wildlife Regional Study Area is larger than the Regional Study Area used for other components of the environmental baseline program. Use of the terms "Regional Study Area" and "RSA" in this document refers to the larger Wildlife Study Area. The RSA was provided by Rescan Environmental Services Ltd., latest version March 2011.

[3] The terms "project" and "study" are not used interchangeably in this report. "Project" and "MRP" refers to the Murray River Project while "study" refers to the Wildlife Habitat Ratings study undertaken by EDI.





Murray River Project

Figure 1. Wildlife Regional Study Area

Drawn:	Datum/Projection:
D. Weber	NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

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2 BACKGROUND

2.1 BIOPHYSICAL SETTING

The Regional Study Area is primarily south of Tumbler Ridge, is approximately 230,000 ha in size, and covers a large portion of the Flatbed Creek, Wolverine River and Murray River watersheds. The RSA includes two ecoprovinces as defined in the British Columbia Ecoregion Classification System. The Sub-boreal Interior comprises the majority (84%) of the RSA, and the Boreal Plains covers the remaining portion along the northeastern margin of the RSA (Demarchi 1996). The Sub-boreal Interior portion of the RSA is within the Central Canadian Rocky Mountains Ecoregion and the Hart Foothills Ecosection. Neighboring ecosections to the south of the RSA include the Northern Hart Ranges and Southern Hart Ranges. The Boreal Plains portion of the RSA is within the Southern Alberta Upland Ecoregion, Kiskatinaw Plateau Ecosection. Table 1 summarizes the ecoprovinces, ecoregions, ecosections, biogeoclimatic units, and administrative areas comprising the RSA. The ecoregion classification units and biogeoclimatic units are shown in context with the project location in Figures 1 and 2.

Table 1. Ecoregion delineation and administrative areas of the Murray River Project RSA.

	ECOREGION CLASSIFICATION UNITS
Ecoprovinces	Sub-boreal Interior (SBI), Boreal Plains (BOP)
Ecoregions	Central Canadian Rocky Mountains (CRM), Southern Alberta Upland (SAU)
Ecosections	Hart Foothills (HAF), Kiskatinaw Plateau (KIP)
	BIOGEOCLIMATIC ECOSYSTEM CLASSIFICATION UNITS
BAFAun	Boreal Altai Fescue Alpine, Undifferentiated
ESSFmvp, ESSFwcp	Engelmann Spruce - Subalpine Fir parkland units: Moist Very Cold Parkland & Wet Cold Parkland
ESSFmv2	Bullmoose Moist Very Cold ESSF
ESSFwk2	Misinchinka Wet Cool ESSF
ESSFwc3	Cariboo Wet Cold ESSF
BWBSmw	Moist Warm Boreal White and Black Spruce
BWBSwk1	Murray Wet Cool BWBS
SBSwk2	Finlay-Peace Wet Cool Sub-Boreal Spruce
	ADMINISTRATIVE AREAS
MOE Regions	9 - Peace
Wildlife Management Units	7-21, 7-22[4], 7-20
Forest District	Peace

2.1.1 Climate and Topography

The RSA is located on the eastern side of the Rocky Mountains, which is generally drier than the western side due to losses of moisture from Pacific air while crossing a number of mountain ranges

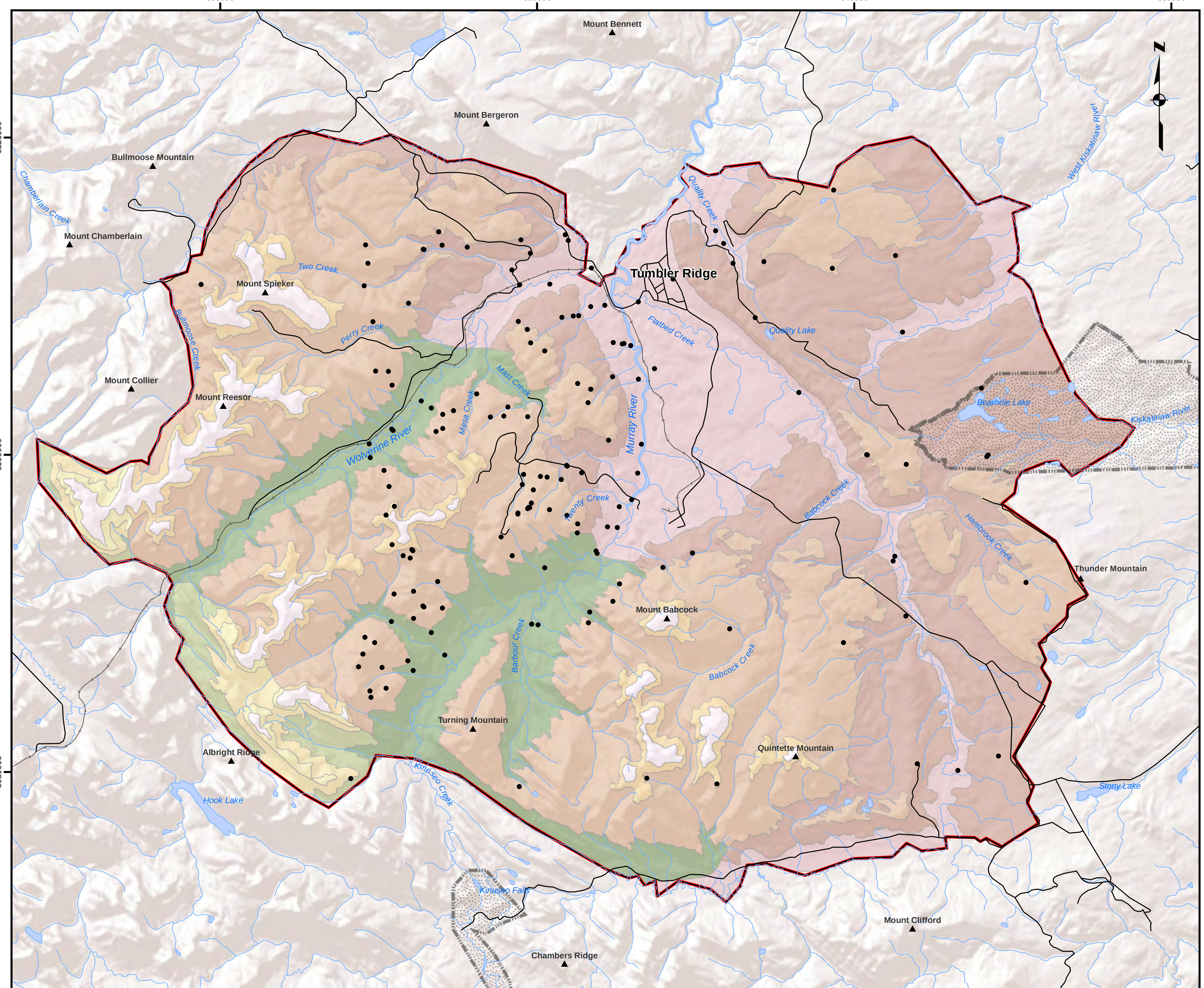
[4] A small portion of the RSA (~2000 ha) falls within Wildlife Management Unit 7-22 on the western-most margin of the RSA.

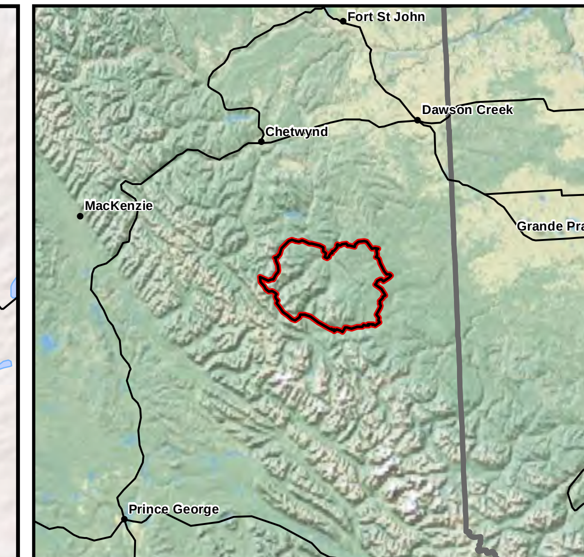
(Demarchi 1996). The RSA encompasses a transition from steep but rounded mountains and foothills in the Central Canadian Rocky Mountain Ecoregion to rolling and flat uplands in the Southern Alberta Upland Ecoregion, Kiskatinaw Plateau Ecosection. The Hart Foothills Ecosection generally gains elevation from north to south. The elevational range exhibited by the region is approximately 700 m in the lowest river valleys to approximately 2100 m at the highest alpine peaks. Convective showers in the summer and winter frontal systems create even precipitation throughout the year in the western portion of the RSA. In the northeastern region the climate is continental, where precipitation is convective, rather than a result of Pacific air flow. Uninhibited inflow of Arctic air results in cold winters (Demarchi 1996).

2.1.2 Biogeoclimatic Classifications

Four biogeoclimatic zones occur in the RSA, including the Sub-Boreal Spruce (SBS; plateaus, lowlands, valleys, and the Northern Rocky Mountain trench), Boreal White and Black Spruce (BWBS; foothill valleys and northern Omineca Mountains), Engelmann Spruce-Subalpine Fir (ESSF; middle to upper elevation mountain slopes) and Boreal Altai Fescue Alpine (BAFA; upper slopes of all mountains). The biogeoclimatic zones are further defined by nine variants: SBSwk2 (Finlay-Peace Wet Cool), BWBSwk1 (Murray Wet Cool), BWBSmw (Moist Warm), ESSFmv2 (Bullmoose Moist Very Cold), ESSFmvp (Moist Very Cold parkland), ESSFwc3 (Cariboo Wet Cold), ESSFwcp (Wet Cold parkland), ESSFwk2 (Misinchinka Wet Cool), BAFAun (undifferentiated). A detailed comparison of the biogeoclimatic zones in the RSA is provided in Appendix A.

The only variant of the SBS in the RSA, SBSwk2, occurs in valley bottoms to 1100 m and is dominated by white spruce (*Picea glauca*) and subalpine fir (*Abies lasiocarpa*), with infrequent lodgepole pine (*Pinus contorta*) in dry areas, and black spruce (*Picea mariana*) in wet areas (Meidinger and Pojar 1991). The BWBS is more commonly found in colder, drier regions than the SBS, on the eastern side of the Rockies between elevations of 650 m and 1050 m (Jones *et al.* 2007). In this zone, white and black spruce and lodgepole pine are dominant and fires are common; therefore, early seral stands of trembling aspen (*Populus tremuloides*) and cottonwood (*Populus balsamifera*) are correspondingly common (Meidinger and Pojar 1991). BWBSmw generally encompasses rolling terrain and is warmer and of intermediate moisture to other BWBS subzones, whereas BWBSwk1 is wetter and cooler with a shorter growing season and is distributed on low to mid elevation slopes (DeLong *et al.* 1990). Above the BWBS zone, the ESSF extends to approximately 1700 m. The ESSF is dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir. As elevation increases and the landscape becomes more open and interspersed with alpine meadows, subalpine fir becomes more prominent and these trees are often stunted (Meidinger and Pojar 1991). The ESSFmv2 is east of the Rocky Mountain divide, above SBSwk2 and BWBSwk1, and the ESSFwk2 is west of the Rocky Mountain divide above the SBS zone. The ESSFwc3 is found above the ESSFwk2 (DeLong *et al.* 1994). At the highest elevations above the ESSF zone, the BAFA zone is comprised either of rock, ice, permanent snow, or ground cover including dwarf shrubs, grasses, sedges, mosses and lichens (Meidinger and Pojar 1991, Jones *et al.* 2007).





LEGEND

- Field Plots
- Regional Study Area

Biogeoclimatic Zones

- BAFAun
- BWBSmw
- BWBSwk1
- ESSFmv2
- ESSFmvp
- ESSFwc3
- ESSFwcp
- ESSFwk2
- SBS wk2

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project

Figure 2. Biogeoclimatic Classification of the Regional Study Area

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

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2.2 REGULATORY CONTEXT

As there are a number of regulations and management strategies applicable to wildlife that will be referred to in this report, a brief description of each follows.

- *Species at Risk Act* (SARA)/COSEWIC
  - The *Species at Risk Act* is federal legislation aimed at preventing species, subspecies and populations from becoming extirpated or extinct in Canada. It protects and enables the recovery of endangered and threatened species through the establishment of prohibitions to protect them and their critical habitat. The Act requires that long and short-term objectives are identified in a recovery strategy and action plan (Environment Canada 2009).
  - Schedule 1 under the Act lists those species at risk under categories of extirpated, endangered, threatened, or special concern. Only once a species is listed on this schedule do conservation and protection measures apply. Note that prohibitions do not apply to species listed as a Special Concern. Schedules 2 and 3 do not offer protection to the species listed on them; however, these species must be assessed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) within a specified time (Environment Canada 2009).
  - Only one of the selected species for this report is listed on Schedule 1 of SARA as Threatened, the Southern Mountain population of woodland caribou.
  - The Act also establishes the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). This group is responsible for identifying species at risk through species assessments (Environment Canada 2009).

- Red-, blue- and yellow-lists/*Wildlife Act*
  - Red-listed species, subspecies or ecological communities are those that are extirpated, endangered or threatened in British Columbia. Red-listed species, as well as those assessed by COSEWIC as extirpated, endangered, threatened or special concern may be considered for legal designation as Extirpated, Endangered or Threatened under the *Wildlife Act*. This designation enables habitat protection in the form of Wildlife Management Areas and increases penalties for harming the species. None of the selected species for this study are currently red-listed or designated under the *Wildlife Act*.[5]
  - Blue-listed species, subspecies or ecological communities are those that are considered of special concern in British Columbia. They are not considered Extirpated, Endangered or Threatened, but are vulnerable to population declines caused by human or natural events. Along with red-listed species, blue-listed species are highlighted as those that could be considered for formal designation as Endangered or Threatened under the *Wildlife Act* or by COSEWIC. Most of the species selected for this study are blue-listed (i.e. caribou, Black-throated Green Warbler, fisher and grizzly bear).

[5] Four species are legally designated: the Vancouver Island Marmot (*Marmota vancouverensis*), American White Pelican (*Pelecanus erythrorhynchus*), and Burrowing Owl (*Athene cunicularia*) as Endangered, and the Sea Otter (*Enhydra lutris*) as Threatened.

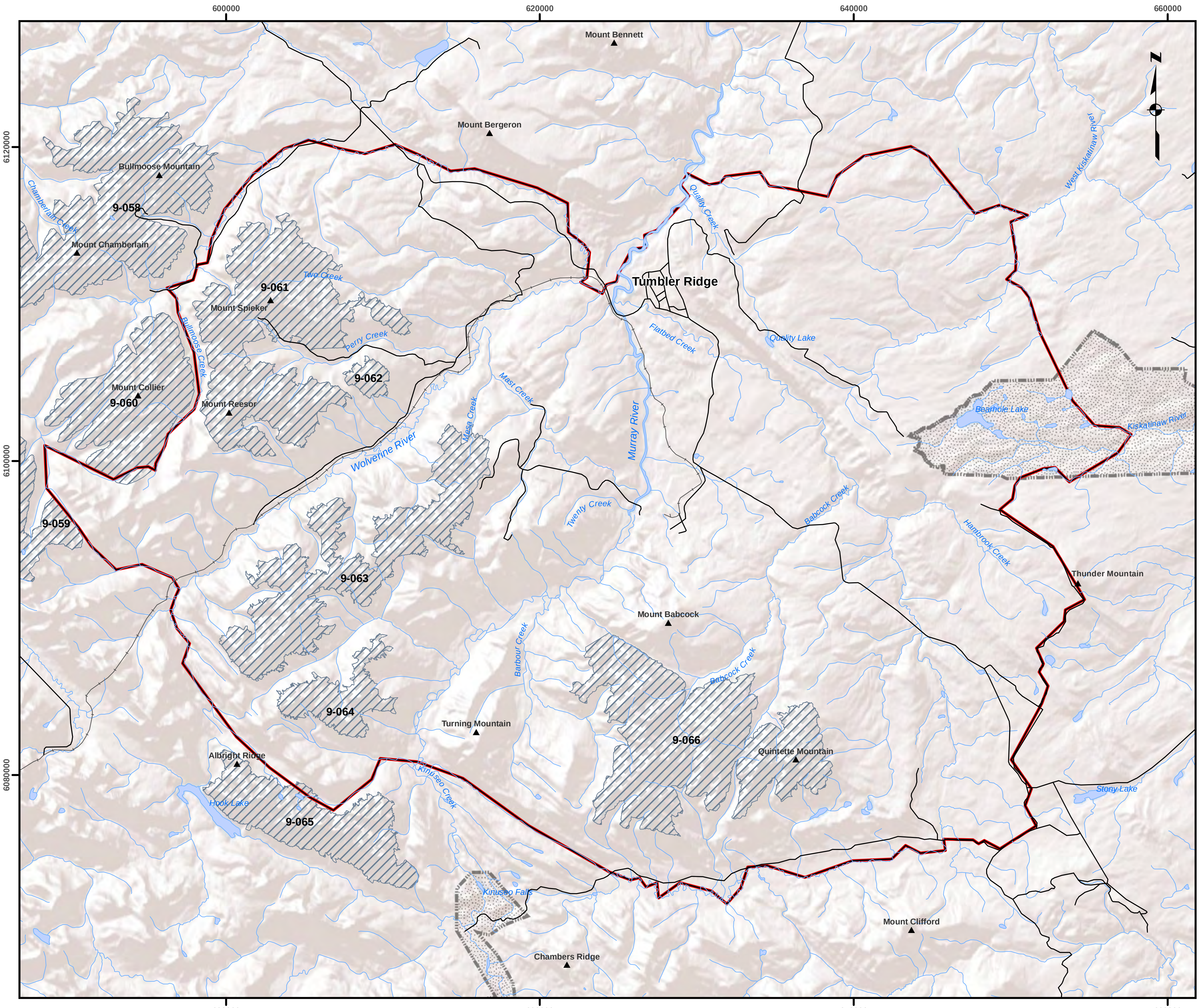
  - Yellow-listed species, subspecies or ecological communities are those that are secure and not at risk in British Columbia. Mountain goat and moose are yellow-listed.
  - The British Columbia *Wildlife Act* protects all wildlife species and their critical habitat or nesting structures. Section 4 of the *Wildlife Act* identifies provisions for the Minister to designate Wildlife Management Areas, Critical Habitat Areas or Wildlife Sanctuaries for the protection of wildlife. Section 5 of the Wildlife Act protects designated habitat except as permitted under other regulations or permits. There are no Wildlife Management Areas, Critical Habitat Areas or Wildlife Sanctuaries as designated by the B.C. *Wildlife Act* within the RSA.

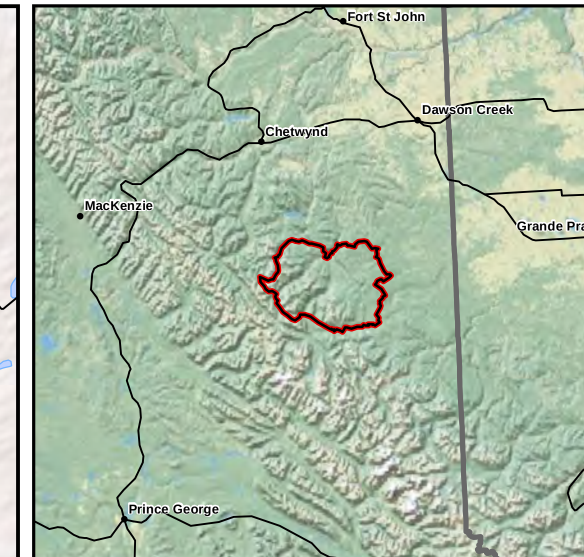
- Identified Wildlife Management Strategy/*Forest and Range Practices Act*

  - This strategy enables the Minister of the Ministry of Environment under the *Forest and Range Practices Act* (FRPA) to designate species as "Identified Wildlife (IW)" from within Species at Risk and Regionally Important Wildlife categories. The species must not be adequately protected by other legislation and be potentially negatively affected by forest and range activities to be designated as IW. The Strategy manages Identified Wildlife through the creation and implementation of Wildlife Habitat Areas (WHAs), General Wildlife Measures (GWMs) and wildlife habitat area objectives. Management practices may also be provided in strategic or landscape level plans.
  - Four of the selected species are Identified Wildlife including caribou, Black-throated Green Warbler, fisher and grizzly bear.
  - Eight Wildlife Habitat Areas for caribou lie within or near the RSA (Figure 3).

- Ungulate Winter Ranges/*Forest and Range Practices Act*

  - Ungulate Winter Ranges (UWR) are areas of necessary winter habitat for a particular ungulate species designated under the *Forest and Range Practices Act* (FRPA). Each are usually associated with an approved order/general wildlife measures.
  - There are eight Ungulate Winter Ranges for Northern caribou and mountain goat within the RSA (Figure 4).





LEGEND

Regional Study Area

Wildlife Habitat Areas

Woodland Caribou

9-000 Tag Number

Parks and Protected Areas

250K National Topographic Database Data

Mountains

Railway

Road

Stream

Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project

Figure 3. Wildlife Habitat Areas

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

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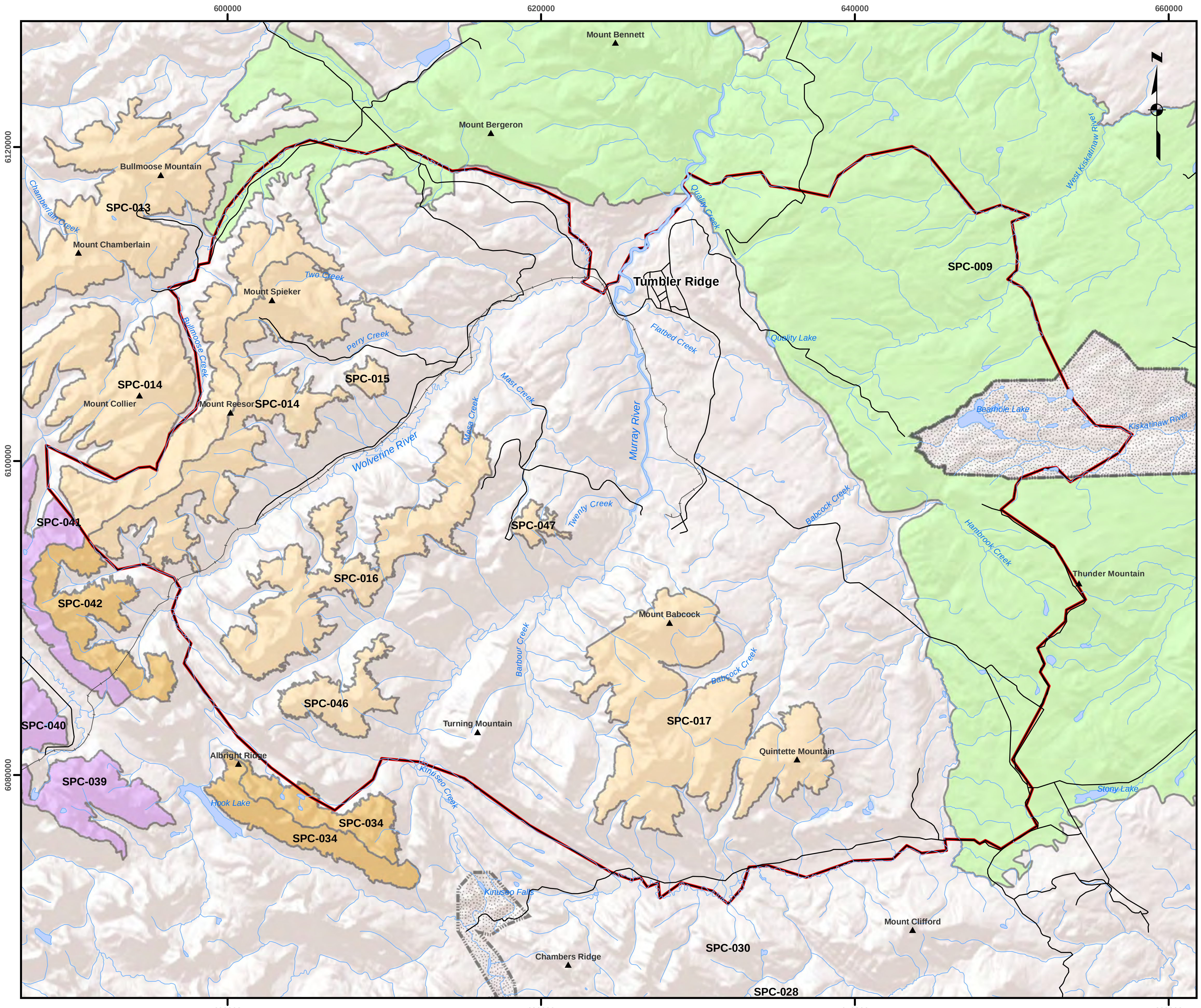

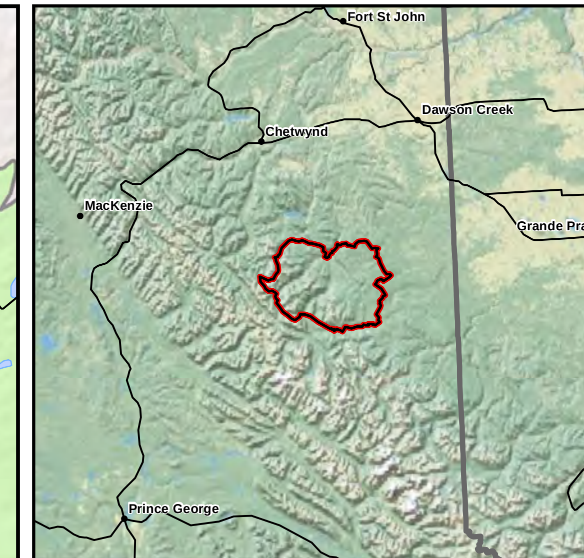

LEGEND

Regional Study Area

Ungulate Winter Range

Species 1 | Species 2

- Woodland Caribou
- Woodland Caribou | Mountain Goat
- Mountain Goat | Woodland Caribou
- Mountain Goat

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project

Figure 4. Ungulate Winter Ranges

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

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2.3 WILDLIFE HABITAT RATINGS

Wildlife habitat ratings quantify the current suitability of a habitat unit to support a wildlife species for a specific season and a specific purpose called a "life requisite". This is an expert-based method where habitat units are rated in a categorical system relative to the best habitat in the province which is termed the "provincial benchmark". Ratings are based on a measurement of the number of animals expected to inhabit a unit area, and indicate expected habitat use by the species for the season and life requisite rated. Ratings can either be capability or suitability ratings (MELP 1999). Capability ratings indicate the capacity of the habitat under optimal seral conditions, regardless of its current state (MELP 1999). Suitability ratings take into account the current seral condition of the habitat (MELP 1999). It is the objective of this study to provide Wildlife Habitat Suitability Ratings for the entire RSA.

Producing wildlife habitat ratings is a multi-step study that involves: species selection, development of a preliminary species-habitat model, field work, and development of the final species-habitat model (MELP 1999). Species are generally selected for a WHR study based on their socioeconomic or ecological importance, which may be identified by legislation or species at risk status, or can be identified by stakeholder groups through consultation processes. Species may also be selected if a proposed project is likely to impact a local population, or if a species is seen as an umbrella species where conserving its habitat will implicitly conserve habitat of other species. Following species selection and prior to field work, a preliminary species-habitat model is developed which consists of producing a species account and preliminary habitat ratings for each selected species. A species account describes information on the species and its life requisites and habitat use specific to the project area. It is produced with information derived from a literature search and consultation with species experts, and provides those details that are used to rate the project area for the species. Preliminary habitat ratings are the predicted ability of the habitat to provide for the species' life requisite and season of use, and are assigned to each ecosystem unit based on their broad description. The ratings are provided in a ratings table and are based on the ratings assumptions, ratings scheme used, and the provincial benchmark, which are all summarized in the species account. Field work then occurs which verifies species-habitat relationships and allows revision of the ratings. The preliminary species account and ratings tables are used as references for this stage. The ratings tables are working entities which are finalized in the final species-habitat model. Verification of the final species-habitat model is achieved through refinement of the model. Refinement of the model is assisted by species expert review. The final ratings incorporate all revisions and provide both capability and suitability ratings for each ecosystem unit. The final species-habitat model also includes final species accounts which likely have also been revised during the progress of the study (MELP 1999).

2.4 STUDY TIMELINE

As the WHR study was initiated in late summer 2010, field work necessary for the study's completion was separated into two field seasons. An interim report was produced to summarize the first component of field work and therefore multiple reiterations of the wildlife habitat ratings tables were made. To clarify the terms used in the interim and final reports that refer to the various reiterations, the following study timeline outlines the steps and products.

- Summer 2010: Study initiation
    - Initial[6] wildlife habitat ratings were developed in preparation for the first component of field work
- October 2010: Field work – first component
    - Resultant field data allowed revision of initial wildlife habitat ratings into preliminary wildlife habitat ratings
- March 2011: Interim Report
    - Provided documentation of both initial and preliminary wildlife habitat ratings
- July 2011: Field work – second component
    - Resultant field data allowed revision of preliminary wildlife habitat ratings into final wildlife habitat ratings
- April 2012: Final Report
    - Provides documentation of preliminary and final wildlife habitat ratings

The interim report produced in March 2011 provided a summary of 2010 field work efforts and produced both capability and suitability ratings. However, due to incomplete structural stage information within the PEM dataset available at the time of production (Rosen *et al.* no date), habitat capabilities rather than suitabilities were assigned to the ecosystem units within the PEM Area and subsequently mapped. This PEM also only covered a portion of the RSA, referred to in that report as the "PEM Area." With the completion of a PEM specific to the Murray River Project by Rescan Environmental Services Ltd. (Rescan) for the entire RSA area, the suitability ratings developed in early 2011 have been applied to the ecosystem units of the area. A review of these ratings was completed prior to final habitat suitability mapping to incorporate new information resulting from 2011 field work efforts and expert review of the species accounts. This final report presents the final species-habitat models, including final wildlife habitat ratings and final species accounts, a summary of 2010 and 2011 field work and final habitat suitability mapping. The final report builds upon the interim report, reiterating relevant descriptive and methodological information, detailing progress since the production of the interim report and presenting the final results of the WHR study. The final report is intended as a stand-alone document.

[6] Note that the term "initial" wildlife habitat ratings is not recognized in the BC Wildlife Habitat Assessment Standards (MELP 1999). It was a term created during the preparation of the interim report to allow for a second reiteration of the wildlife habitat ratings prior to the presentation of the final ratings in the final report; therefore, the sequential stages of ratings created by this study are: initial, preliminary and final.

3 METHODS – SPECIES-HABITAT MODEL DEVELOPMENT

3.1 SPECIES SELECTION

Species were selected for this study because their importance was identified by legislation, they are umbrella species representing habitat requirements for a group of animals, they have socioeconomic importance or their habitat likely overlaps directly with the location of the proposed development (Table 2). During the course of an EA and the development of valued ecosystem components (VEC), recommendations for modifications to this species list can be made by stakeholders. It is not expected or typical for projects in the region to complete habitat modeling on every wildlife VEC identified. The number and types of species is similar for a recent proposed project in the vicinity of the Murray River Project. For example, the Hermann Mine EA certificate application had 10 wildlife VECs identified, including five of the six selected species for this study (WCCC 2007b). Species representative of a range of wildlife that occur in the area were selected to provide flexibility should analysis of additional species be recommended by stakeholders or become necessary in completing EA requirements.

Table 2. Summary of rationale for species selection.

Species	SARA Schedule 1	B.C. Blue List	Identified Wildlife	Ungulate Winter Range within RSA	Socioeconomically Important	Umbrella species	Habitat Location
Woodland Caribou	✓	✓	✓	✓[7]	✓		
Black-throated Green Warbler		✓	✓				✓
Mountain Goat				✓	✓		
Moose					✓		✓
Grizzly Bear		✓	✓		✓		✓
Fisher		✓	✓		✓	✓	✓

3.2 PRELIMINARY SPECIES-HABITAT MODEL DEVELOPMENT

Species-habitat model development, that is both ratings and species accounts, was initiated in late summer 2010 with a literature and data search, a review of existing species accounts information, development of preliminary[8] habitat ratings table, and field work planning. Research and review of existing data and literature was initiated in preparation for the first field component and continued throughout the study until final reporting stages. The following sources of information have been reviewed to date for current information on regulatory matters, ecosystem units, wildlife and wildlife habitat within the RSA.

[7] In addition to UWRs, there are also Wildlife Habitat Areas for woodland caribou within the RSA.
[8] Which was considered an "Initial" habitat ratings table for this study.

- Online searchable databases:
  - B.C. Conservation Data Centre (CDC)/B.C. Species and Ecosystems Explorer – species listed by B.C., COSEWIC, SARA, IWMS
  - Species at Risk Act Public Registry – species listed on Schedule 1 of *SARA*
  - Ecological Reports Catalogue (Ecocat) – digital reports and their associated files
- Existing area-specific ecosystem unit and wildlife information:
  - Rescan Environmental Services Ltd. (Rescan). 2012. *Murray River Coal Project: 2010-2011 Ecosystem and Vegetation Baseline Report*. Prepared for HD Mining International Ltd. by Rescan Environmental Services Ltd.: Vancouver, British Columbia.
  - Rosen, D., Blashill, W. and M. Coderre. no date. Predictive Ecosystem Mapping for Canfor's TFL48 (Chetwynd). Available at: http://www.env.gov.bc.ca/esd/distdata/ecosystems/wis/pem/warehouse/region_7_Peace_Omineca/tfl48_4044/ecosystem/non_standard/pem_4044_pro.pdf
  - Geowest Environmental Consultants Ltd. 2002. Terrestrial Ecosystem Mapping with Wildlife Interpretations for the Lower Sukunka Landscape Unit, British Columbia. Volume I: Terrestrial Ecosystem & Bioterrain Mapping with Expanded Legends for Terrestrial Ecosystem Units. Prepared for Canadian Forest Products Ltd. (Canfor).
  - Saxena, A., and L.P. Bilyk. 2000. Terrestrial Ecosystem Mapping with Wildlife Interpretations for the Lower Sukunka Landscape Unit, British Columbia. Volume II: Wildlife Habitat Suitability Interpretations for Terrestrial Ecosystems – Canfor T.F.L #048. Prepared for Canadian Forest Products Ltd. (Canfor).
  - B.C. Ministry of Environment (MOE). 1977. Wildlife Resources of the Northeast Coal Study Area 1976-1977.
  - iMapBC – a web-based mapping tool for natural resource information
- Species and area specific primary and secondary literature
- Personal communications with wildlife species and ecology experts

Existing species accounts written by Saxena and Bilyk (2000) were collected and used as a starting point of information for wildlife habitat rating. These species accounts have been reviewed as part of the larger literature search and expert consultation for species information concerning wildlife populations specific to the RSA. Project-specific species accounts were presented as part of the interim report. Since that time, each have been reviewed by a species expert and revised.

An initial ratings table was available for this study from the final ratings table of an existing TEM. This table was used for field work planning and data collection in late summer 2010 and modified in subsequent modeling processes during interim report preparation in 2011. This resulting preliminary habitat ratings table is provided in Appendix B. The preliminary habitat ratings table was used for field work planning and data collection in for July 2011 field work and subsequently revised into final ratings.

Field work planning involved collection and review of available spatial data, delineation and mapping of potential sampling plots and logistical planning. The following spatial datasets were used in pre-field planning:

- 1:20,000 TRIM Raster
- Rosen, D., Blashill, W. and M. Coderre. no date. Predictive Ecosystem Mapping for Canfor's TFL48 (Chetwynd). Available at http://www.env.gov.bc.ca/ecology/tem/dataware.html
- Geowest Environmental Consultants Ltd. 2002. Terrestrial Ecosystem Mapping with Wildlife Interpretations for the Lower Sukunka Landscape Unit, British Columbia. Volume I: Terrestrial Ecosystem & Bioterrain Mapping with Expanded Legends for Terrestrial Ecosystem Units. Prepared for Canadian Forest Products Ltd. (Canfor).
- Saxena, A., and L.P. Bilyk. 2000. Terrestrial Ecosystem Mapping with Wildlife Interpretations for the Lower Sukunka Landscape Unit, British Columbia. Volume II: Wildlife Habitat Suitability Interpretations for Terrestrial Ecosystems – Canfor T.F.L #048. Prepared for Canadian Forest Products Ltd. (Canfor).

3.3 FIELD COMPONENT

The first component of field work was completed October 25th – 30th, 2010 and the second component was completed July 11th – 18th, 2011. Surveys were conducted as per protocols of the B.C. Resources Information Standards Committee (*British Columbia Wildlife Habitat Rating Standards* (MELP 1999), *Field Manual for Describing Terrestrial Ecosystems* (MOF & MOE 2010)). In 2010, 125 plots were completed to standard field protocols, 42 of which were ground inspection plots. The remaining 83 were visual inspections completed from the ground or during aerial overview flights. In 2011, 32 plots were completed, all of which were ground inspection plots. Locations of the field plots are depicted on Figure 2. Both Ground Inspection Forms (GIF) and Wildlife Habitat Assessment (WHA) forms were completed for the ground inspection plots, while only the GIF were completed for visual inspections. Representative photos were taken at each ground-based plot, and aerial photos were taken of each visual inspection completed during overview flights. Photographs are provided in digital format, accompanying a hard-copy of this report.

A reconnaissance level survey for wildlife habitat ratings was selected given the large size of the RSA (>225,000 ha). Under this survey intensity level, 0-4% of the PEM ecosystem units were to be visited and the ratio of full plots : ground inspections : visual inspections should be 0 : 25 : 75. No full plots were completed in this survey and the ratio of ground plots to visual plots exceeded the recommended survey intensity at 47 : 53. As the PEM (Rescan 2012) was created in raster data format, ecosystem units were not easily delineated as the number of unique polygons as would be the case for a vector data format. The number of unique polygons was considered the number of unique grid codes in the PEM (3099). Of the

3099 unique grid codes, 108 were visited within 157 total plots completed. That is, a number of unique grid codes were visited by more than one plot. Therefore, 3.5% of PEM ecosystem units were visited. Field data is presented in Appendix C.

3.4 DATA ENTRY AND QUALITY ASSURANCE

All field data was entered into an Excel® spreadsheet. Data collected under Ground Inspection Forms and Wildlife Habitat Assessment forms were separated into worksheets.

Data entry was subject to Quality Analysis (QA) by revisiting at least 10% of all entered field cards for each field component. In the 2010 field data, no mistakes were found within four of the 42 Wildlife Habitat Assessment forms inspected, and two mistakes were found within 13 of 125 the Ground Inspection Forms inspected. In the 2011 field data, no mistakes were found within five of the 29 Wildlife Habitat Assessment forms inspected, and no mistakes were found within five of the 32 Ground Inspection Forms inspected.

3.5 FINAL SPECIES-HABITAT MODEL DEVELOPMENT

3.5.1 Species Accounts

Following submission of the interim report in March 2011, each of the six species accounts were submitted to an external species expert for their review. Comments for consideration and suggested edits were provided by each of the reviewers. Revisions to the accounts were made accordingly. Additional information suggested by reviewers or found through continual literature and data search over the course of the study was also incorporated. For example, as the area covered by this study expanded between drafting the interim and final reports from the "PEM Area" to the entire RSA, a second caribou herd needed to be incorporated into that account. Information on the Bearhole/Redwillow herd, including its distribution, threats, status and habitat requirements, were inserted into the account. As the habitat requirements of that herd are different than those of the Quintette herd, a separate set of wildlife habitat ratings was required for this herd; the wildlife habitat ratings development assumptions are also described in the species account. A separate set of maps for the Bearhole/Redwillow herd was also produced. Final species accounts are included in Section 4.

Species experts who provided species account review are as follows.

- Woodland Caribou – Dale Seip, Ph.D., Wildlife Ecologist, Ministry of Environment
- Black-throated Green Warbler – Mark Phinney, R.P.F., R.P.Bio., District Biologist, Louisiana-Pacific Canada Ltd.
- Mountain Goat, Moose and Fisher – R. Scott McNay, Ph.D., R.P.F., R.P.Bio., Project Manager/Ecologist, Wildlife Infometrics, Inc.
- Grizzly Bear – Lana Ciarniello, Ph.D., R.P.Bio., Aklak Wildlife Consulting

3.5.2 Wildlife Habitat Ratings and WHR Development Assumptions

Wildlife habitat ratings were based on individual species habitat requirements compiled from existing information, expert knowledge and field work. Final wildlife habitat ratings were not primarily derived from ratings assigned in the field but were rather refined mostly in an office exercise from the preliminary ratings table produced by the interim report; field data was used as a check against office-assigned ratings. The preliminary ratings table was revised according to information obtained from species expert review and continuous literature and data search. It was also used as a reference in the field during the second component of field work and in this way checked for coarse congruence with field conditions. Field wildlife habitat rating was used to familiarize biologists with the ecosystem units and the range of vegetation types and abundances within each unique unit. Fieldwork provided species vegetation lists for the units and therefore provided context to biologists completing the ratings on the range of vegetation likely to be found in particular units. It also calibrated biologists to complete extrapolated ratings to the entire PEM dataset in the office. The species habitat requirements and rationale used to derive and revise ratings are documented in the species accounts (Section 4). Potential limitations of this method is discussed Section 3.7.

The effectiveness of this method of assigning final wildlife habitat ratings is demonstrated by a high level of similarity between field and office-extrapolated ratings. Ratings applied in the office were very similar to those assigned in the field[9]. Using July 2011 field plots at which wildlife habitat ratings and ecosystem unit were determined, quality analysis of the office ratings was completed. Of 21 field plots, 20 plots had greater than 50% of all field-applied WHRs agree within one rating value to the office assigned ratings; 13 plots had greater than 75% agree within one rating. All 21 plots had greater than 50% of all field-applied WHRs agree within two rating values to the office assigned ratings; 17 plots had 100% agree within two ratings.

3.6 GIS MAPPING AND ANALYSIS

Wildlife habitat suitability ratings were assigned in tabular data format for each vegetated structural stage among those site series that occurred in the PEM data. Prior to import to GIS, Excel data was imported into an Access database for data formatting manipulations. The PEM data was used as the base spatial data set to join to the tabular data indicating the wildlife habitat suitability ratings for each species. The data was joined spatially using ArcGIS® version 10.

The analysis method differed for mountain goat. Mountain goat ratings were assigned using a GIS modeling analysis rather than in tabular format. Slope/aspect is the primary determinant of habitat suitability for mountain goat. A slope/aspect model was developed for this purpose and was used solely to rate habitat for mountain goat as opposed to rating habitat by site series. Modeling methods are described in detail in the mountain goat species account.

[9] This method of comparisons between field and office ratings could not be applied to mountain goat and caribou due to the different methodologies used to derive ratings for these species.

3.7 POTENTIAL SOURCES OF ERROR

One of the primary potential sources of error for this study is the accuracy of the PEM to which the wildlife habitat ratings are assigned to produce wildlife habitat suitability maps. Of the 26 field plots completed in 2011 with assigned ecosystem units, three match exactly to the ecosystem unit and structural stage of the PEM for that area. Four of the plots are close to the PEM assignment, being off by only one structural stage unit. This is not a surprising result and does not necessarily reflect inaccuracy of the PEM or field work efforts. Much of this discrepancy is likely due to the scale at which the assignment of the ecosystem unit is being made. For example, the on-the-ground assessment may delineate an ecosystem unit which is dwarfed by a larger differing unit delineated by the PEM. In addition, PEM standards may accept ecosystem units within one site series and one structural stage of difference (N. Bush, *pers. comm.*) reflecting the complexity and difficulty of these projects.

Another comment concerning the PEM and assignment of wildlife habitat ratings is that they may not accurately reflect the progressing nature of large-scale ecosystem disturbance, particularly mountain pine beetle attack. Within the RSA area, that is, east of the Rockies and south of Tumbler Ridge, the main mountain pine beetle attack likely occurred in 2004/2005; presently, the RSA is in various stages of attack. WHRs were assigned to ecosystem units and structural stages assuming conifer trees were live and standing. Wildlife habitat values of stands containing infected lodgepole pine could be decreased or increased depending on the species and life requisites of interest. These effects could be magnified by extent and stage of infestation. A detailed analysis would be required to determine the full impact of mountain pine beetle infestation on the wildlife habitat ratings at present and into the future.

Another source of error for this study is that ratings were primarily office-assigned based on general descriptions of the ecosystem units within the PEM. This translates into ratings that are based on ecosystem units and do not incorporate "plot-in-context" effects. A plot-in-context effect is a potential increase or decrease of wildlife use of an ecosystem unit due to proximity to a favorable or unfavorable feature. Office assignment of these ratings removed the potential for observers' ratings being influenced by in-field interpretation of "plot-in-context" effects. However, these effects may be valuable to incorporate for some species and life requisites using a systematic methodology. Proximity effects can be incorporated into the base ratings by modifying the ratings using GIS functionalities for each desired species and life requisite. Mountain goat ratings were completed solely with GIS modeling, but there is opportunity to modify other ratings using a combination of GIS modeling and the expert-based WHR's presented in this report.

4 RESULTS – SPECIES-HABITAT MODELS

A species-habitat model consists of a species account and associated ratings tables. The six species accounts for the Murray River Project WHR Study are presented in this section. Associated products, the final Wildlife Habitat Suitability ratings tables are contained in Appendix D and the final Wildlife Habitat Suitability maps are contained in Appendix E.

4.1 WOODLAND CARIBOU

4.1.1 Distribution, Threats and Status within the RSA

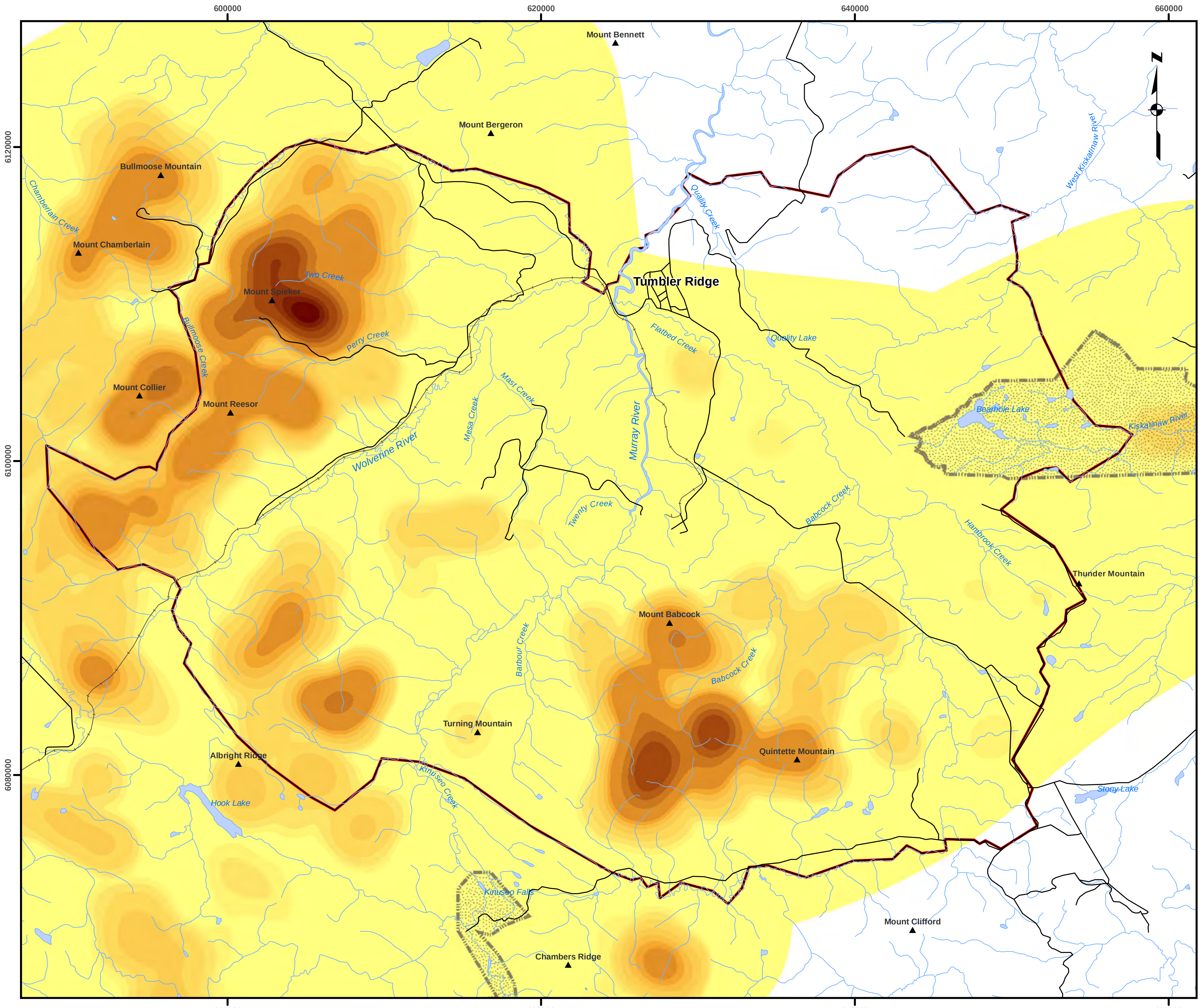
Distribution

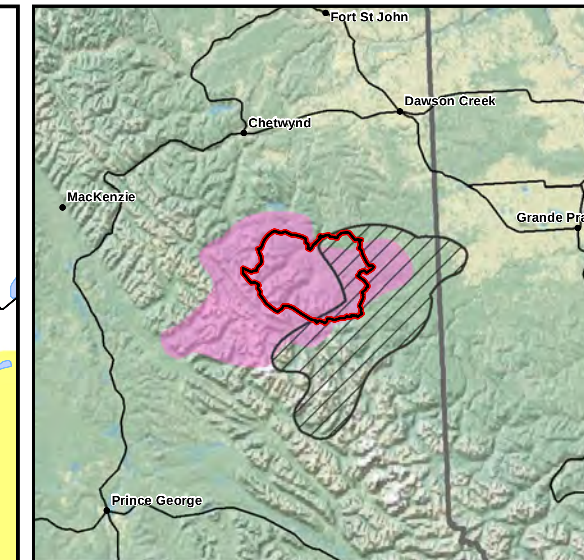
Caribou in the Regional Study Area are members of either the Quintette or Bearhole/Redwillow herds which are populations[10] of the northern ecotype[11] of the Woodland Caribou subspecies (*Rangifer tarandus caribou*) (Jones 2009, WCCC 2007a, Jones *et al.* 2004a). The northern ecotype (a.k.a. northern caribou) of woodland caribou reside in the mountainous and associated plateau sections of the west-central, east-central and northern interior of British Columbia where snowfall accumulations are low in comparison to other areas of the province (MWLAP 2004a). Northern caribou most commonly inhabit low elevation pine or black spruce forests in the winter and alpine/subalpine areas during calving and in the growing season. Some northern ecotype herds, including the Quintette herd, reside in the alpine year-round. This herd is found southwest of Tumbler Ridge, generally bounded by the divide to the Parsnip watershed to the west, Kinuseo and Thunder Creeks in the south and Bullmoose Creek in the north (WCCC 2007a) (Figure 5). However, some overlap with the Parsnip herd to the southwest beyond Kinuseo Creek has been documented (Jones *et al.* 2007). Within the RSA, the Quintette herd is generally found in the western portion of the RSA while the Bearhole/Redwillow[12] herd is found in the eastern portion (Figure 6); there is some movement between herds (Seip and Jones 2011). The Bearhole/Redwillow herd winters in the areas near Bearhole Lake and Redwillow River (Seip and Jones 2011).

[10] Note that it is uncertain that these groups are distinct biological populations or if they are part of larger metapopulations.

[11] Ecotype: a grouping based on a similar pattern of habitat use, seasonal movements and winter diet selection. Ecotypes are not formal taxonomic designations. There are three ecotypes of woodland caribou found within British Columbia: boreal, mountain and northern caribou.

[12] Provincially, this herd is part of the larger Narraway herd (D. Seip 2012 *pers. comm.*)





LEGEND

Regional Study Area

Estimated Caribou Density

Low

High

250K National Topographic Database Data

Mountains

Railway

Road

Stream

Waterbody

INSET LEGEND

Estimated Quintette Caribou Herd Range

Estimated Bearhole/Redwillow Caribou Herd Range

Note: Minimum convex polygons were created using ET GeoWizards (Build Convex Hull tool), a third party GIS extension for ArcGIS®, using Quintette and Bearhole/Redwillow telemetry data (2002-2011 and 2006-2010 respectively, South Peace Caribou Research Program) provided by the Ministry of Environment. Polygons were generalized (smoothed) for presentation. Density raster datasets were created using ArcGIS® extension, Spatial Analyst (Kernel Density Tool). The data was clipped by their respective minimum convex polygon.

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project

Figure 5. Estimated Quintette Caribou Herd Range and Density within the RSA

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-29	Data Sources: Refer to References Section

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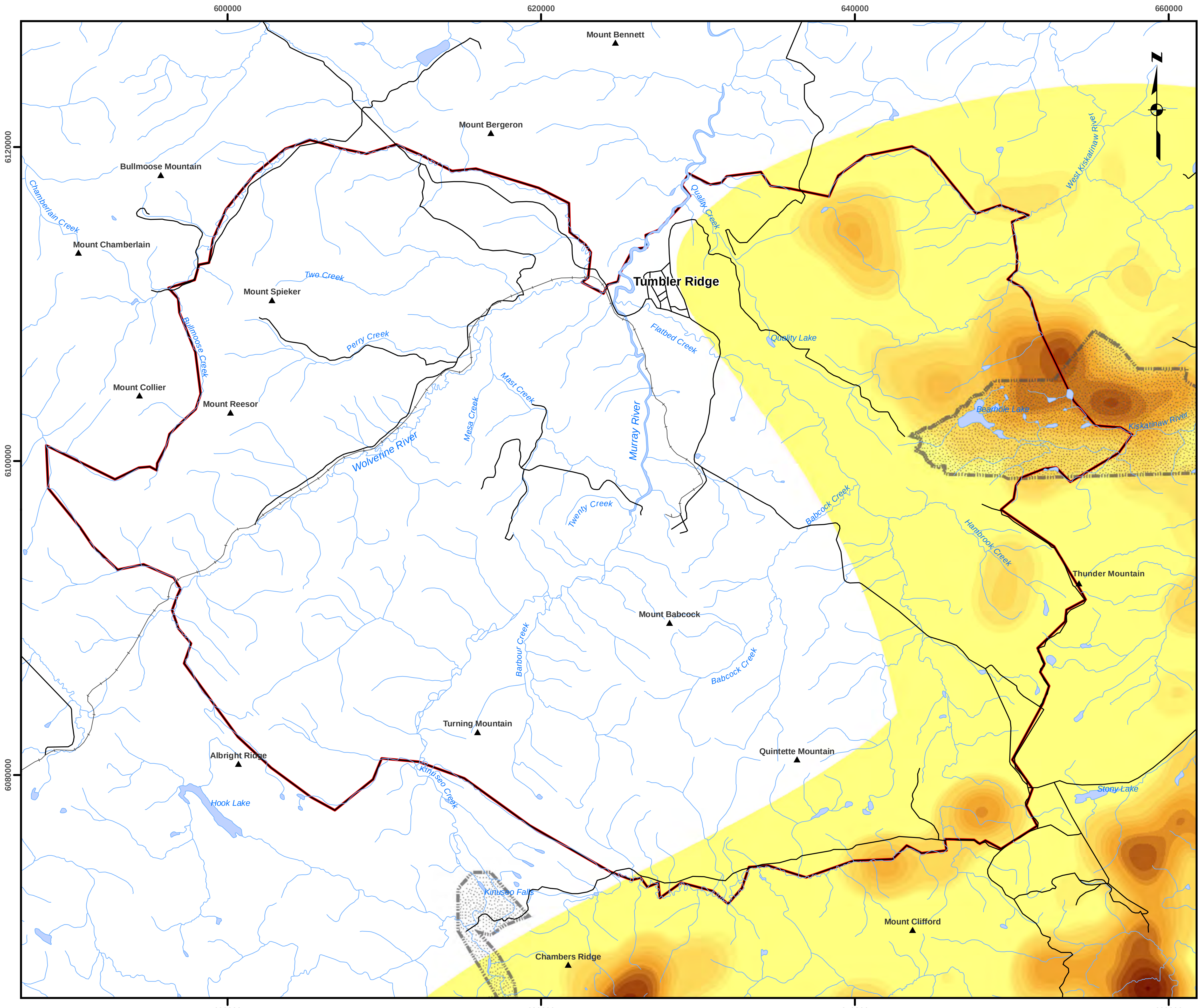

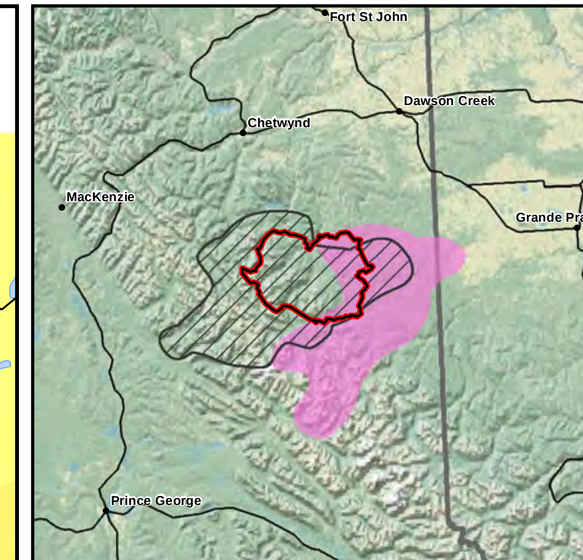

LEGEND

Regional Study Area

Estimated Caribou Density

Low

High

250K National Topographic Database Data

Mountains

Railway

Road

Stream

Waterbody

INSET LEGEND

Estimated Bearhole/Redwillow Caribou Herd Range

Estimated Quintette Caribou Herd Range

Note: Minimum convex polygons were created using ET GeoWizards (Build Convex Hull tool), a third party GIS extension for ArcGIS®, using Quintette and Bearhole/Redwillow telemetry data (2002-2011 and 2006-2010 respectively, South Peace Caribou Research Program) provided by the Ministry of Environment. Polygons were generalized (smoothed) for presentation. Density raster datasets were created using ArcGIS® extension, Spatial Analyst (Kernel Density Tool). The data was clipped by their respective minimum convex polygon.

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project

Figure 6. Estimated Bearhole/Redwillow Caribou Herd Range and Density within the RSA

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-29	Data Sources: Refer to References Section

EDI

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Threats & Status

The Quintette and Bearhole/Redwillow herds are part of the Southern Mountain metapopulation within the Southern Mountains National Ecological Area, which is composed of several small, isolated herds. Many of these herds are subject to increased levels of harassment and predation, loss of critical habitat and displacement to sub-optimal habitat (COSEWIC 2002a, WCCC 2007a). Caribou are sensitive to forestry, mining and other developments, transportation corridors, hunting and other recreational activities. These types of land disturbances can cause them to move from preferred to suboptimal habitat.

There are various means by which anthropogenic activities can impact caribou and their habitat. There is some documentation that human activities or disturbance cause caribou to move from or avoid once preferred habitats (e.g. Cumming and Hyer 1998 and Bradshaw *et al.* 1997 in MWLAP 2004a). Dryer and colleagues (2001) documented maximum avoidance distances of 250 m from roads and seismic lines and 1000 m from oil and gas wells. Another study found caribou avoided the area within 4 km of a 2 km^2 mine site during most seasons (Weir *et al.* 2007). Increased development and associated linear developments such as roads, transmission lines, oil/gas right-of-ways, and seismic exploration line increases access for both predators and people to caribou habitat. Increased predation pressure appears to be a result of increased access and a complex predator-prey system where high predator numbers can be sustained by other ungulate populations and in turn support increased predation on caribou (MWLAP 2004a). Wolves have the potential to eradicate a small caribou population that has been weakened by other natural and anthropogenic factors. Hunting has been documented as a contributing factor in a number of caribou population declines. Direct loss, fragmentation and degradation of habitat occurs frequently through agricultural encroachment, timber harvesting, mining developments as well as through natural causes such as wildfire (COSEWIC 2002a).

Due to the declining population numbers and range of a number of caribou herds within the Southern Mountains National Ecological Area, the metapopulation including the Quintette and Bearhole/Redwillow herds, is considered threatened by the Committee on the Status of Endangered Wildlife in Canada and is legally designated as such on Schedule 1 of the *Species at Risk Act* (*SARA,* BC CDC 2011; Table 3). Listing on Schedule 1 of the *Species at Risk Act* requires that recovery planning be completed for these animals. Both herds within the RSA are the ecotype of woodland caribou that is blue-listed provincially. Most recent population status assessments conducted in 2008 have estimated 173 to 218 individuals within the Quintette herd and a minimum population count of 49 caribou within the Bearhole/Redwillow herd (Seip and Jones 2011). The Quintette herd is increasing while the Bearhole/Redwillow herd is likely declining (Seip and Jones 2011).

The southern mountain population, including the Quintette and Bearhole/Redwillow herds, is provincially designated as "Identified Wildlife" under the Identified Wildlife Management Strategy. There are eight Wildlife Habitat Areas for northern caribou within or bordering the RSA (WHA 9-059 to 9-066). Approved orders and general wildlife measures are available to guide proponents undertaking activities within these Areas. Ungulate Winter Range #U-9-002 designated for caribou and mountain goats includes units SPC-

009, 014, 015, 016, 017, 046, 047 that are within the RSA. None of the WHAs or UWRs lie within the proposed project footprint as identified in current mine planning.

Table 3. Status of woodland caribou (*Rangifer tarandus caribou*), northern ecotype (BC CDC 2011).

RISC Species Code	M-RATA
Provincial Status	S3 – special concern, vulnerable to extirpation or extinction
B.C. List	Blue
Identified Wildlife (Yes/No)	Yes
COSEWIC Status	T - Threatened
Global Status	G5T4Q - G5 = Secure—Common; widespread and abundant, T4Q = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

4.1.2 Habitat Requirements & Habitat Suitability Ratings

Introduction

Caribou habitat use requirements for forage and security elements vary between the seasons and life stages. By definition, habitat use and selection differs between the three woodland caribou ecotypes, but it also differs between herds of the same ecotype. Our study and the following discussion focused on habitat use and selection by the Quintette herd and the Bearhole/Redwillow herd as documented by a number of studies undertaken within the RSA.

Habitat selection by caribou in all seasons is a balance between forage availability, forage abundance, and forage quality with risk of predation (Jones *et al.* 2007). In our study, the life requisites that were rated for northern caribou were: LI-W (living in winter[13]), LI-G (living in the growing season[14]) and RB (birthing). Living requisites (LI), incorporating both feeding and security requirements, were chosen for rating rather than rating habitats separately for these requirements as it is more likely that caribou habitat use is based on a favorable combination of features providing both forage and security from predation. No studies documenting unique habitat use for security, forage or thermal requirements alone were found. The objective of this study was to document any valuable habitat and its relative quality to any life requisite of the selected species; generalized life requisites such as living in the growing season were deemed sufficient to meet this objective given the level of information on the species requirements within the RSA while ensuring that important life stages with specific habitat requirements were rated (e.g. calving) (MELP 1999). Specific environments for thermal cover do not appear to be required due to the high cold tolerance of

[13] The winter season includes the months of November to April as defined for the Subboreal Interior ecoprovince per the Chart of Seasons by Ecoprovince (MELP 1999).

[14] The growing season is a combination of spring, summer and fall seasons and includes the months of May to October as defined for the Subboreal Interior ecoprovince per the Chart of Seasons by Ecoprovince (MELP 1999).

caribou and consequently was not selected for rating (Edmonds and Bloomfield 1984 in Saxena and Bilyk 2000).

The Quintette herd is known to use the alpine and subalpine extensively year-round. A study by Jones and colleagues (2007) found that the Quintette herd selected for elevations greater than 1300 m and generally avoided pine- or spruce-leading forests as well as shrub, deciduous and young coniferous stands. They believed that predation risk from wolves might have been higher within these vegetation cover types. Selection for western and southern aspects and avoidance of steeper slopes and eastern and northern aspects was also documented in this study (Jones *et al.* 2007).

The Bearhole/Redwillow herd generally restricts use of the alpine to the growing season and winters in low-elevation boreal forests near Bearhole Lake and Redwillow River (Seip and Jones 2011). Generally habitat use and requirements by this herd are not yet well studied and documented (FIA Project Completion Report 2007-2008).

Winter

The winter diet of northern caribou primarily consists of terrestrial lichen. During poor snow conditions, when the energetic costs of cratering through deep or crusted snow are too high, arboreal lichens may also be consumed. Secondary forage may also include dwarf shrubs. Wintering areas where lichens are available include alpine tundra, subalpine forest, mid-elevation pine stands and wetlands. Different ecotypes and herds within ecotypes make use of different areas and exhibit differing winter migration patterns in response to predation risk, snow depths and snow density.

In a study by Jones and colleagues (2007), caribou of the Quintette herd were found to primarily use alpine areas from early winter to spring. Concentration on windswept alpine ridges above 1700 m was typical (Jones *et al.* 2004b, Jones 2007). Within the RSA, Mount Spieker and Quintette/Babcock Mountains alpine complexes appear to be the most heavily used (Figure 5). Occasionally Mount Reesor and Fortress Mountain are also used (WCCC 2007a). Although most members of the Quintette herd remain in the alpine during the winter season, there have been a few documented cases of individual caribou moving to low elevation habitats (D. Seip, *pers. comm.*).

The Bearhole/Redwillow herd follows a different pattern of winter habitat use and diet selection. Lower elevation boreal forest with potential for terrestrial or arboreal lichen such as pine and spruce forests are used by wintering caribou. A study by Jones (2009) indicated that caribou selected for mature pine, pine-leading, black spruce-leading and tamarack-leading stands while deciduous, shrub and fir-leading forests were avoided. Non-vegetated and natural openings were also avoided. A 2007-2008 FIA Project, *Habitat Use of Woodland Caribou in the Peace Forest District*, documented use of spruce and spruce-pine forests and foraging on arboreal lichens during years of deep or dense snow. In more favorable snow years, Bearhole/Redwillow caribou fed on both terrestrial and arboreal lichens. In these years, the caribou were found in young pine forest, mature pine-spruce, mature spruce and mature tamarack forest; GPS collar locations have indicated these locations are often close to lakes, rivers or wetlands (FIA Project Completion

Report 2007-2008). Use of these forest types, not typically used by other ungulates is believed to create separation between caribou and their predators (Bergerud *et al.* 1984 in Jones 2009).

The winter season provincial benchmark for northern caribou is the undifferentiated Spruce-Willow-Birch/Alpine Tundra (SWBun/AT) biogeoclimatic zone, Lodgepole pine – Alpine Grassland of the Stikine Plateau (STP) ecosection within the Northern Boreal Mountains. The provincial benchmark possesses a rating of "1" and provides a comparison against which habitats within the study area are rated (MELP 1999).

Growing Season

In the growing season, woodland caribou eat willow and birch leaves, other shrubs (e.g. mountain ash), Labrador tea and Vaccinium species. These species are abundant in subalpine meadows and moist high-elevation forests. In the study by Jones and colleagues (2007), Quintette caribou again selected for alpine or parkland areas during calving and summer/fall seasons. Use of low elevation forests in spring was not documented and may demonstrate an exchange of higher quality green forage for a lower risk of predation in alpine areas. Lower elevation forests on the eastern side of the Rockies, including within the RSA, may not be as productive and may support a higher number of ungulates (and therefore predators) than the wetter western side of the Rockies (Jones *et al.* 2007). During the summer and calving periods, the use of subalpine, fir-leading, high elevation habitat by the Quintette herd increases (WCCC 2007a). Sopuck (1985, in WCCC 2007a) also found that Quintette caribou used high elevation alpine and open subalpine habitats exclusively in summer and fall (WCCC 2007a).

Members of the Bearhole/Redwillow herd may move to alpine and subalpine areas for the growing season or conversely remain in low elevation forests (FIA Project Completion Report 2007-2008, Jones 2009). Females calve in the alpine and subalpine and males may be more likely to remain at lower elevations year-round (Jones 2009). Migration to higher elevations is likely an anti-predator tactic during the calving season (Seip 1992 in Jones 2009).

The growing season provincial benchmark is the Alpine Tundra (AT), Alpine meadow of the Stikine Plateau (STP) ecosection within the Northern Boreal Mountains. The provincial benchmark possesses a rating of "1" and provides a comparison against which habitats within the study area are rated (MELP 1999).

Birthing

The calving period for woodland caribou is generally the month of June. Calving tends to occur in subalpine krummholz (Sopuck 1985 in WCCC 2007a), parkland or alpine tundra areas. Sites selected for calving are high elevation as an anti-predator tactic. Pre-calving females may migrate between 10 and 40 km to calving grounds (Jones 2007). Calving areas used by the Quintette herd have been documented on Mount Reesor within the RSA and Mount Collier just west of the RSA and extending southwest to the Hominka drainage (of the Parsnip River watershed) (WCCC 2007a). Existing information on specific calving areas used by the Bearhole/Redwillow herd was not found.

Habitat Suitability Ratings

Since the level of knowledge concerning northern caribou is relatively high, the 6-class Habitat Suitability Rating Scheme was used: 1 (High), 2 (Moderately High), 3 (Moderate), 4 (Low), 5 (Very Low), 6 (Nil). Ratings were assigned to ecosystem units within the RSA based on their relative quality compared to the provincial benchmarks for caribou living in winter, living in the growing season and birthing habitats. Tables 4 and 5 describe specific ecosystem attributes that provide for each of the caribou life requisites for each herd rated by this study.

Within the Regional Study Area, the highest rated habitats for Quintette herd caribou living in the winter, growing season and during birthing were alpine areas. These areas are documented as high use areas and are most likely to have exposed terrestrial lichens. Ratings of 1 to 3 were assigned to these areas based on specific habitat requirements of the three life requisites and vegetation characteristics expected based on site series within the PEM. The PEM legend provided by Rescan was used to provide this information. ESSF parkland units were rated between 2 and 4 as these areas are also high elevation and likely to contain suitable forage species. Some use of the ESSF in the growing season is likely; however, very minimal use of low elevation forests has been documented for the Quintette herd. Consequently, primarily forested ecosystem units in the ESSF, BWBS and SBS were assigned lower ratings of 4 to 6, 5 to 6, and 5 to 6, respectively.

The highest rated habitats for the Bearhole/Redwillow herd living in the winter were ecosystems considered to have potential for terrestrial lichen availability and were assigned ratings of 1 to 3. The BWBS and SBS biogeoclimatic units with mature structural stage classes of 5 to 7 fit that description. Generally forests with a component of pine and potential for terrestrial lichens were rated higher than other forest types with potential for arboreal lichen (e.g. ESSF biogeoclimatic zones were rated lower 3 – 5). Regional field guides for site interpretation (e.g. DeLong *et al.* 1994) were used to provide this information. Younger structural stages were rated much lower, with structural stages 2 and 3 and deciduous/broadleaf ecosystem units receiving ratings of 4 and 5. Wetlands were rated between 2 and 5 depending on potential vegetation species.

For the Bearhole/Redwillow herd in the growing season, alpine and subalpine/parkland areas were rated alike the Quintette herd with ratings of 1 to 4. However to accommodate for those individuals that remain at low elevation in the growing season, the remainder of the units were rated similarly to the Bearhole/Redwillow winter season ratings.

Alpine areas were rated highest, with ratings of 1 and 2, as birthing habitats for both herds. ESSF parkland was also rated highly (2-4), while other non-parkland ESSF, SBS and BWBS units were rated at nil (6).

Table 4. Quantifiable ecosystem attributes for northern caribou, Quintette herd (modified from Saxena and Bilyk 2000).

Season	Life Requisite	Ecosystem Attributes
Winter	LI	• alpine and ridges where terrestrial lichens are exposed • high use of windswept alpine ridges >1700 m • forage is primarily terrestrial lichen, but arboreal lichen and dwarf shrubs may also be used
Growing	LI	• alpine tundra and parkland that provide abundant terrestrial lichens • subalpine, fir-leading, high elevation habitat may also be used but likely to a lesser degree • forage species include terrestrial lichen, willow, birch, other shrubs, Labrador tea, Vaccinium spp.
Spring	RB	• subalpine krummholz, parkland, alpine tundra • alpine and parkland cirques that provide security from the elements • alpine meadows with clear, open lines of sight

Table 5. Quantifiable ecosystem attributes for northern caribou, Bearhole/Redwillow herd (modified from Saxena and Bilyk 2000).

Season	Life Requisite	Ecosystem Attributes
Winter	LI	MORE FAVORABLE SNOW CONDITIONS • young pine forest, mature pine-spruce, mature spruce and mature tamarack forest with arboreal and/or terrestrial lichen • terrestrial lichens are found and eaten by cratering in pine forests; both terrestrial and arboreal lichens may be foraged in mature pine-spruce forest and black spruce forest/bog[15]; arboreal lichens are used in mature spruce and tamarack forests LESS FAVORABLE[16] SNOW CONDITIONS • spruce and pine-spruce forests with arboreal lichens for easier foraging
Growing	LI	• alpine and subalpine areas • males may be more likely to remain at low elevations for the season (Jones 2009)
Spring	RB	• alpine and subalpine areas

4.2 BLACK-THROATED GREEN WARBLER

4.2.1 Distribution, Threats and Status within the RSA

Distribution

Although relatively common across the southern boreal forest in North America, in British Columbia, the Black-throated Green Warbler is found only in the northeastern section of the province. It occurs primarily in the Peace Lowland of the Boreal Plains ecoprovince (Morse and Poole 2005, MWLAP 2004b), and has also been found within the Taiga Plains and Sub-Boreal Interior ecoprovinces (MWLAP 2004b). There are no observations of confirmed[17] breeding within the Regional Study Area (RSA); however, there are six

[15] FIA Year-end Report 2008-2009

[16] Less favorable snow conditions consist of higher snow depths and densities such that cratering through snow for terrestrial lichens is energetically inefficient.

[17] Observations of confirmed breeding include a nest with eggs or young, an adult carrying a fecal sac or food for young, an adult leaving, occupying or entering a nest, fledged young, a used nest or egg shells, distraction display and nest building (for most species) (BCBBA 2008).

observations of possible[18] breeding within or near the RSA (BCBBA 2008). Confirmed breeding records for this species occur north of the RSA, near Chetwynd, Dokie Ridge, Charlie Lake and near Fort St. John (BCBBA 2008).

The RSA is likely at or near the current range limit of the species within B.C. (M. Phinney (2011a), *pers. comm.*). If present within the RSA, the warbler is likely restricted to mixedwood forest of low elevation slopes and valley bottoms within the following biogeoclimatic zones: BWBSmw, BWBSwk1 and SBSwk2 (Saxena and Bilyk 2000). Within the BWBS, the warbler has been primarily recorded in the BWBSmw variant (Cooper *et al.* 1997). Over its range, observations of the warbler primarily occur within the elevational range of 650 to 800 m, but it may occur at elevations over 1200 m (Morse and Poole 2005). Within the RSA, it is expected to inhabit areas up to 900 or 1000 m (M. Phinney (2011b), *pers. comm.*).

Threats & Status

The Black-throated Green Warbler has a large breeding range over North America and is generally abundant over this range (Morse and Poole 2005). Consequently, this warbler is not a listed species by COSEWIC and is globally assessed as widespread, abundant and secure (BC CDC 2011) (Table 6). In British Columbia, it is blue-listed and an identified wildlife species. There are no Wildlife Habitat Areas under the Identified Wildlife Management Strategy for Black-throated Green Warbler within the RSA (MOE 2009a).

The species is blue-listed in B.C. due to its restricted distribution and relatively small populations within the province (Cooper *et al.* 1997). It is believed that the species expanded its range into the B.C. Peace Region in the latter half of the twentieth century. Although there is little data on the population size within B.C., the warbler is thought to be at least fairly common in specific locales of mature mixedwood stands southwest of Dawson Creek in comparison to other warblers (Cooper *et al.* 1997). As this species displays a high degree of site fidelity to breeding areas, and its populations are likely concentrated to a small range within B.C., the warbler population is vulnerable to population declines caused by human or natural events.

The Black-throated Green Warbler is a forest-interior species and therefore is sensitive to forest fragmentation (Morse and Poole 2005). This applies to both its breeding range in North America and to its preferred winter habitats in Mexico, Central America and the West Indies (Morse and Poole 2005). The Black-throated Green Warbler has been noted as avoiding forests that are fragmented by such activities as forestry and agriculture (Hobson and Bayne 2000). The primary habitat threat in B.C. is forest harvesting especially of mature mixedwood and spruce stands (Cooper *et al.* 1997). The warbler is not overly sensitive to human activities except those that degrade or destroy breeding habitat or forage abundance (e.g. timber harvesting, vegetation removal, pesticide application; Cooper *et al.* 1997).

[18] Indicators of possible breeding include an observation of the species, a singing male(s) or breeding calls within suitable nesting habitat during the breeding season (BCBBA 2008).

Table 6. Status of Black-throated Green Warbler (*Dendroica virens*) (BC CDC 2011).

RISC Species Code	B-BTNW
Provincial Status	S3B – Special Concern
B.C. List	Blue
Identified Wildlife (Yes/No)	Yes
COSEWIC Status	N/A
Global Status	G5 = demonstrably widespread, abundant, and secure

4.2.2 Habitat Requirements & Habitat Suitability Ratings

Introduction

Over its range, the Black-throated Green Warbler's habitat is varied and encompasses the full range of forest types including purely coniferous, mixedwood, and purely deciduous (Morse and Poole 2005, Cooper *et al.* 1997). It is generally agreed upon that some component of their habitat requirement is coniferous. In B.C., information on habitat use by the Black-throated Green Warbler is limited (Cooper *et al.* 1997). Their breeding habitat is generally described as mature and old-growth mixedwood forest and transitional areas of coniferous and deciduous forest. The warbler in its B.C. range uses purely deciduous stands very infrequently; however, just a few mature conifers in a stand may attract the species (Cooper *et al.* 1997).

In this study, the life requisite that was rated for Black-throated Green Warbler was RE (reproducing[19]). This requisite was chosen for rating as it incorporates a number of habitat requirements including those for feeding, nesting and security that must be met in the breeding season (i.e. spring/early summer). Habitats could be rated separately for these requirements; however, feeding and nesting habitat requirements are the same at this time of year (MWLAP 2004b). Security/thermal habitat requirements are met by habitat attributes that provide for foraging and reproducing habitats and were not rated separately. Post-breeding, living habitat could also have been rated but this habitat is expected to be more diverse and difficult to rate and therefore this option was not selected for this study.

Reproducing

Breeding habitat requires habitat attributes for feeding, nesting and security. During breeding season the warbler forages on forest insects, usually along conifer branches, within the mid- to upper canopy (Morse and Poole 2005, Cooper *et al.* 1997). Forage insects are primarily lepidopteran caterpillars, but also include true bugs, spiders and beetles. Stands with a higher deciduous component than the nesting habitat may be

[19] The reproducing life requisite for Black-throated Green Warbler inherently occurs in the spring season, which generally includes the months of May and June as defined for the Subboreal Interior ecoprovince per the Chart of Seasons by Ecoprovince (MELP 1999).

used more heavily for foraging during the post-breeding/fledgling season. Nesting habitat may require a component of mature conifer trees. If purely deciduous forests are used, preference for old-growth aspen (>120 years) has been demonstrated in Alberta (J. Schieck in Cooper *et al.* 1997). Nesting occurs primarily in mature conifers, usually between 2 to 8 m above ground, but occasionally up to 20 m above ground (Morse and Poole 2005). Nests are usually close to the trunk, but may also be farther out in a branch fork (Cooper *et al.* 1997).

Consequently, breeding habitat is typically mature to old-growth mixedwood stands in British Columbia. Structural stages 6 (mature forest, 80 – 140 years) and 7 (old forest, greater than 140 years) are preferred (MWLAP 2004b). Preferred mixedwood stands are usually white spruce with trembling aspen and/or balsam popular. Primarily deciduous forest may also be used if there are a few veteran spruce trees in the canopy (Cooper *et al.* 1997, Saxena and Bilyk 2000). Stand structure may be variable but the stands used tend to have a mesic moisture regime (Cooper *et al.* 1997). Typical understory plant species include: rose, baneberry, highbush-cranberry, bunchberry, fireweed, kinnikinnick, mosses, peavine and American vetch (Cooper *et al.* 1997). The warbler is most associated with the *white spruce-trailing raspberry-step moss* site series (BWBSmw/101) (Cooper *et al.* 1997).

In recent local study, Preston *et al.* (2007) examined habitat attributes recorded in the vicinity of singing Black-throated Green Warblers. Since singing males indicate possible breeding, these attributes characterize suitable habitat within the RSA. Typical habitat included conifer-dominated stands greater than 80 years old with low shrub cover and high herbaceous cover. Sites tended to be relatively wet more often than dry moisture regimes. The most common tall shrub (>2 m) was alder, while the most common short shrubs (<2 m) were rose, twinberry and highbush-cranberry. The most common herbs were bunchberry, coltsfoot, grass and fireweed. Slopes were generally shallow at less than 15°.

Recent research has indicated that Black-throated Green Warbler may avoid riparian habitats, opposing previous documentation that this was the primary habitat for the species (Phinney 2003). Although some Black-throated Green Warbler occupy riparian habitat, preferred habitat in northeastern B.C. includes upland mature/old aspen-spruce mixedwood stands.

Habitat Suitability Ratings

The Habitat Suitability Rating Scheme used was 4-class: N(il), L(ow), M(oderate), H(igh) due to an intermediate knowledge of species' habitat use. Table 7 summarizes the attributes used to assign habitat suitability ratings to the RSA based on ecosystem units at the site series and structural stage level. Usually, ratings are assigned to ecosystem units within the RSA based on their relative quality compared to the provincial benchmarks for the species habitat. However, the provincial benchmark for Black-throated Green Warbler has not been established. In lieu of a provincial benchmark, the BWBSmw/101 (*white spruce-trailing raspberry-step moss*) site series for mature structural stages was given the highest ratings as it best meets these habitat criteria. Cooper *et al.* (1997) suggests that the warbler is most associated with this site series in B.C.

Within the RSA, Black-throated Green Warblers are expected to reproduce only within mature or old-growth mixedwood forest of low elevation slopes and valley bottoms within an elevational range of approximately 650 to 1000 m. All biogeoclimatic zones found at high elevations, which were alpine, parkland or high-elevation ESSF (i.e. BAFA, ESSFmvp, ESSFwc3, ESSFwcp, ESSFwk2, ESSFmv2) were given nil ratings. Also non-mature structural stages (i.e. 2 – 4) and non-forested areas of all ecosystem units were given nil ratings. Lower elevation site series within the BWBSmw, BWBSwk1 and SBSwk2 were given nil ratings if the tree species composition within mature forests did not include a component of white spruce. For example, purely black spruce, purely lodgepole pine or mixes thereof were given nil ratings. Remaining forest stands were given ratings from low (L) to high (H) depending on whether the stand was primarily trembling aspen and white spruce regeneration understory (L) or primarily white spruce (M – H). High (H) ratings were given to the *white spruce-trailing raspberry-step moss* site series (BWBSmw/101), *balsam poplar-dogwood-highbush-cranberry/trembling aspen-cow parsnip-meadowrue/balsam poplar-white spruce-mountain alder-dogwood* (combined) site series (BWBSmw/111$/112) and *hybrid white spruce-oak fern site series* (SBSwk2/01), structural stages 6 (Mature Forest) and 7 (Old Forest).

Table 7. Quantifiable ecosystem attributes for Black-throated Green Warbler (modified from Saxena and Bilyk 2000).

Season	Life Requisite	Ecosystem Attributes
Spring	RE	• tall, mature and old-growth mixedwood forest and transitional areas of coniferous and deciduous forest (i.e. middle to late seral-stage) • structural stages 6 and 7 • primarily deciduous forest may be used if there are a few mature or veteran conifers • if purely deciduous forests are used, preference for old-growth aspen (>120 years) • mesic moisture regime, wetter sites preferred over drier • typical understory plant species include: alder, rose, baneberry, twinberry, highbush-cranberry, bunchberry, fireweed, coltsfoot, grass, kinnikinnick, mosses, peavine and American vetch • low shrub cover and high herbaceous cover • slopes <15°

4.3 MOUNTAIN GOAT

4.3.1 Distribution, Threats and Status within the RSA

Distribution

Mountain goats are widely distributed through B.C. with an estimated population of 39,000 to 65,500 animals in the province (MOE 2010a). Approximately 6% of this number or 2000-4000 animals are estimated to occur in the Peace Region and the regional population is reported to be stable (MOE 2010a).

The oldest estimate record found for the area was from the Northeast Coal study. This area encompassed a 4300 square mile or 11,000 km^2 "core area" of proposed coal development that includes the 2300 km^2 Murray River Project RSA. The goat population was estimated at 200 animals in 1977 based on habitat suitability mapping (MOE 1977). Mountain goat surveys conducted between 1989 and 2003 documented 21 goats within the RSA in 1989 and 33 goats in 2003 out of 362 mountain goats in the various survey areas within the Peace and South Peace. Table 8 summarizes these surveys.

The Northeast Coal study authors (MOE 1977) attributed new road access to negatively affecting the goat population at Bullmoose Mountain, which is partly in the RSA, where 250 goats were observed as recently as 10 years prior, but no goats were known to occur in 1977. There was a successful transplant of 20 goats at Bullmoose Mountain in 1983/1984 (MOE 2010a). In 1989, an inventory of the Bullmoose Mountain area reported a total of 60 animals, an August 1990 inventory reported 44 goats (MOE SPI) and approximately 110 goats were observed there in 2003 (MOE 2010a). Goats were transplanted unsuccessfully at Mt Spieker in 1989, which is completely within the RSA (MOE 2010a).

Mountain goats in the Peace Region and in general occur in clumped distribution (Shackleton 1999) and based on existing survey data within the RSA there are a number of moderate abundance areas. Ungulate winter ranges have been delineated throughout the region based on known habitat that is suitable in combination with population survey data (Goddard 2003). The most suitable habitat in the RSA occurs in rugged, high elevation terrain concentrated in the western portion of the RSA.

Table 8. Population estimates for mountain goat relevant to the MRP RSA.

Year	Source	Study Area	Survey Type	Total # Observations	Total # observations within RSA
1989	MOE-SPI	Bullmoose Mountain	Aerial census	60	21
1990	MOE-SPI	Bullmoose Mountain	Aerial census	44	0
1994	MOE-SPI	Bullmoose Mountain	Aerial census	99	0
2003	MOE-SPI	South Peace	Aerial census	362	33
2005-2008	MOE-SPI	Peace Region	Incidental observations	95	No UTMs

Threats & Status

The Northeast Coal study Wildlife Program reported an estimated population of 200 animals based on field studies and a potential population of 2420 animals if habitat was in ideal condition (MOE 1977). The study categorized habitat into three capability classes with the best habitat estimated at supporting 22 goats per square mile and the least capable habitat supporting eight goats per square mile. The authors reported goat populations in the area declined sharply since access was created during coal and other resource developments. Mountain goats are economically important in B.C. with annual license fees and associated value from residents totaling $535,000 and guide outfitter revenue generating $4 million annually (MOE 2010a). Overhunting is a potential threat; Rice and Gay (2010) discuss how overhunting historically has extirpated and threatened some populations throughout southern B.C. and the U.S.

In addition to roads and hunting pressure, mountain goats and their habitat can be disturbed and potentially impacted by a number of other factors such as low flying aircraft (Goldstein *et al.* 2005, Cote 1996), predation, severe winter weather and disease (MOE 2010a). A study conducted by Goldstein *et al.* (2005) documented that fright responses of goats were linked to distance of helicopter overflights. Goldstein *et al.* (2005) also attribute increases to the boost in popularity of backcountry tourism activities such as heli-skiing, heli-hiking and sightseeing. Guidelines for aircraft use around wildlife for the Peace Region recommend a 2 km horizontal separation and 100 m vertical separation from goats in calving season, and avoidance of winter range areas (MOE 2008). In the Peace Region, January 15 to July 15 is a critical timing window for mountain goats and November 1 to January 14 is a cautionary timing (MOE 2009b).

The Mountain Goat is provincially "yellow-listed" which is defined by the BC Conservation Data Center (BC CDC) as "apparently secure and not at risk of extinction." The BC CDC bases this status on parameters such as population, distribution and threat due to the loss of habitat. More than half of the world's population of mountain goats resides in B.C. where the population remains widely distributed and most mountain goat habitat is not under imminent threat (Wilson 2005). Mountain goat is not listed under the *Species at Risk Act*. Table 9 summarizes the provincial, federal and global status of the mountain goat.

Currently, mountain goats are not provincially listed as "Identified Wildlife" under the Identified Wildlife Management Strategy. There are designated Ungulate Winter Ranges (UWR) that apply to mountain goats within the RSA. These areas are as follows: UWR #U-9-002, units SPC 014 – 017, 046, 047 for caribou primarily and mountain goats secondarily. SPC 034 is primarily for mountain goats and secondarily for caribou. Figure 4 shows the UWRs in context of the RSA.

Table 9. Status of mountain goat (*Oreamnos americanus*) (BC CDC 2011).

RISC Species Code	M-ORAM
Provincial Status	S4 – Not at risk, apparently secure and not at risk of extinction.
B.C. List	Yellow
Identified Wildlife (Yes/No)	No
COSEWIC Status	N/A
Global Status	G5 = demonstrably widespread, abundant, and secure

4.3.2 Habitat Requirements

Introduction

For Wildlife Habitat Suitability Rating, the generalized living life requisite for both the growing season and the winter season were selected. Rating "Living-Winter" and "Living-Growing" was suited to the level of information on the species requirements within the RSA and is consistent with wildlife habitat ratings methods (MELP 1999). Specific requisites such as feeding and shelter were not rated because escape terrain is the dominating factor that overrides other requirements for determining habitat suitability (Hamel and Cote 2007, Poole *et al.* 2006, Scheck *et al.* 2006, Cote and Festa-Bianchet 2001).

Habitat Requirements

Mountain goats stay near steep, rugged slopes in order to escape predation. Escape terrain is the most important factor influencing habitat selection by mountain goats, regardless of season (Poole *et al.* 2006, Scheck *et al.* 2006, Cote and Festa-Bianchet 2001). Numerous studies in B.C. have examined the angle of slope required for escape terrain and the distance requirement from escape terrain selected by mountain goats. Poole *et al.* (2006) reported that terrain greater than 40 degrees was selected as suitable habitat and the distance to escape terrain had more than four times greater weight in predicting habitat use than variables such as an inverse relationship to mature dense forest and positive relationships to solar radiation or ruggedness. Poole and Heard (2003) reported mean annual slope use among collared goats averaged 38° and that similar steepness of slopes was occupied in winter and the growing seasons. In a recent review of habitat models developed for mountain goats in B.C., Wilson (2007) determined that a slope range between 30º and 60º defined suitable escape terrain.

Hamel and Cote (2007) suggested that the proximity to escape terrain, especially by mountain goat females with young, was more important than the quality of forage sites. In terms of the most suitable distance to escape terrain, MOE (2010) summarized literature on goat habitat selection and reported that 400-500 m distance from escape terrain was selected, and that distance was typically less in the winter season. Some studies reported that mountain goats were most likely to be located less than 400 m of escape terrain (e.g. 150 m, Taylor and Brunt 2007). Two regional reports (Poole and Heard 2003, Scheck *et al.* 2006) recommended that habitat within 500 m of escape terrain should be considered important for mountain goats.

Mountain goats are classified as generalist herbivores and diet composition between individuals likely will differ significantly depending on plant composition adjacent to their respective escape terrain locales. Generally, forage will consist of grasses (>50%), forbs (30%) and browse (15%) species, growing within alpine meadows close to cliffs and rocky outcroppings (Hamel and Cote 2007).

Goats are known to make vertical migrations from high elevation in the summer to steep south facing subalpine forested and alpine area in the winter (Wilkinson 2000). Low elevations can also provide suitable habitat and locally in the RSA it is known that “canyon goats” exist in low elevations with escape terrain (Scheck *et al.* 2006).

Winter

Two factors influencing mountain goat habitat suitability are dependent on season: elevation and aspect. Snow depths influence available forage as well as mountain goats’ ability to escape predators. Windswept ridgelines and rock outcroppings are preferentially selected due to lower snow depths, whereas in areas where snow loads are high, goats will frequently overwinter in mature forests just below the tree line, where the thick canopies provide high snow interception (Wilson 2005, Poole and Heard 2003). Poole and Heard (2003) reported that 90% of winter goat locations occurred within an elevation range of 1330 m to 2320 m during a mark/recapture study in the Robson Valley, B.C. In this study, habitat use occurred at a minimum elevation 500 m lower in the winter than in summer. Habitat use was primarily within the alpine in the summer.

Although goats consume a wide range of forage, winter forage selection for mountain goats is more restricted and consists primarily of browse species not covered by snow. Fox *et al.* (1989) suggested up to 90% of mountain goat's winter diet consists of conifers, lichen and vaccinium shrubs. In mild winters where snow depths are significantly lower than average, mountain goats will continue to consume summer forage such as grasses, sedges and rushes (Saxena and Bilyk 2000). Warm aspects may have more access to forage and have lower snow depths. Scheck *et al.* (2006) used habitat modeling to assist in delineating mountain goat winter range in the Peace Forest District. They used the attributes of greater than 42º slope and warm (134º – 285º) aspect to select suitable winter habitat.

The winter season provincial benchmarks for mountain goats are the Mountain Hemlock-Amabalis Fir/RO–Rock (MHmm), and Englemann Spruce-Subalpine Fir/RO–Rock (ESSFdk) biogeoclimatic zones of the Nass Ranges (NAR) and Southern Park Ranges (SPK) ecosections within the Coast Mountains and Southern Interior Mountains. The provincial benchmark is assigned a rating of "1" and provides a comparison against which habitats within the study area are rated (MELP 1999).

Growing Season

Throughout most of the growing season, goats generally occupy rugged high elevation terrain above the tree line (Wilson 2005). Higher elevation alpine tundra areas are generally selected due to proximity to escape terrain and heat avoidance (Saxena and Bilyk 2000). In the spring, like most ungulates, goats frequently migrate to mineral licks in order to replenish nutrient deficiencies brought on by malnutrition during the harsh winter months. Mountain goats may travel relatively long distances away from escape terrain in otherwise poor goat habitat in order to access historically used mineral licks (Fox *et al.* 1989).

The growing season provincial benchmarks are the Alpine Tundra (AT) of the Southern Park Ranges (SPK) and Nass Ranges (NAR) ecosections within the Southern Interior Mountains and Coast Mountains. The provincial benchmark is assigned a rating of "1" and provides a comparison against which habitats within the study area are rated (MELP 1999).

4.3.3 Habitat Suitability Ratings

Since the level of knowledge on the habitat requirements of mountain goats is well documented, the 6-class Habitat Suitability Rating Scheme was used: 1 (High), 2 (Moderately High), 3 (Moderate), 4 (Low), 5 (Very Low), 6 (Nil). Ratings were assigned within the RSA based on their relative quality compared to the provincial benchmarks and existing information on local habitat requirements for mountain goats in the winter and growing seasons. Two habitat models were created throughout the RSA for mountain goats: LI-W Living in winter[20] and LI-G Living in growing season.

Slope Aspect Modeling

We modeled habitat suitability for mountain goats within the RSA using slope, aspect and elevation. Table 10 summarizes the specific attributes used to model habitat suitability for mountain goats in the RSA. Spatial modeling was completed using TRIM 1:20,000 vector data as the base data set to filter out terrain that met the criteria as described in Table 10. The contour data, with an interval of 20 m elevation, was converted into a Triangulated Irregular Network (TIN) file for each map sheet using an ArcGIS® extension program called ET GeoWizard®. The program uses the elevation from the contour data set to create triangles that comply with the Delaunay criteria (see de Berg *et al.* 2008). In general, the vertices in the polyline vector data for each contour are used as mass points for triangulation. "The TIN model represents

[20] Winter season includes November to April as defined for the Subboreal Interior ecoprovince (MELP 1999). Growing season includes spring, summer, and fall and is defined as May through September.

a surface as a set of contiguous, non-overlapping triangles. Within each triangle the surface is represented by a plane (Environmental Systems Research Institute, Inc. 2011)."

The TIN data was further analyzed by the same program to create the following for each triangle:

- minimum and maximum elevation,
- mean elevation,
- the slope by degree or percent, and
- aspect by compass direction or general direction.

These data were then used as the base dataset to filter for the specific slope, aspect, and elevation requirements for goat habitat.

The slope category of 30° to 60° was derived by sorting the slope degree attribute field of the TIN data as greater than or equal to 30 degrees and less than or equal to 60 degrees (≥ to 30 and ≤ 60). The aspect data was created using the aspect value representing the compass bearing where 0 is true north and 90 degrees is east. Warm aspect was created using values greater than or equal to 134 degrees and less than or equal to 285 degrees (≥134 and ≤ 285). Cool aspects were determined by aspects greater than 285 and less than or equal to 360 degrees or greater than or equal to 0 degrees and less than 134 degrees (>285 and ≤ 360 or ≥ 0 and <134). Elevation categories were derived using the minimum elevation attribute field of the TIN data. The elevations were sorted as either greater than or equal to 1200 m (≥ 1200) or less than 1200 m elevation (<1200).

Verification of Model – Mountain Goat Location Point Data

During this analysis, the output TIN data was overlaid with existing mountain goat location data available for surveys between 1989 and 2003. The points were compared with the occurrence of escape terrain for one mapsheet, 93P.013. Approximately one third of all locations coincided with escape terrain at 30 to 60 degrees slope. Of the 638 goat observations, 279 fell with 50 meters of escape terrain, 300 goats were within 100 meters, 632 were within 200 meters, and all locations were within 400 meters of escape terrain. The 200 meter proximity made the most sense to use as a "proximity to escape terrain" buffer; however; we did not use a buffer in the final model as a 200 meter buffer identified most of the western portion of the RSA as highly suitable goat habitat in the 1 or 2 rating category (Figure 7). This defeated the purpose of identifying and quantifying the most highly suitable habitat using expert based modeling and a relative rating scheme.

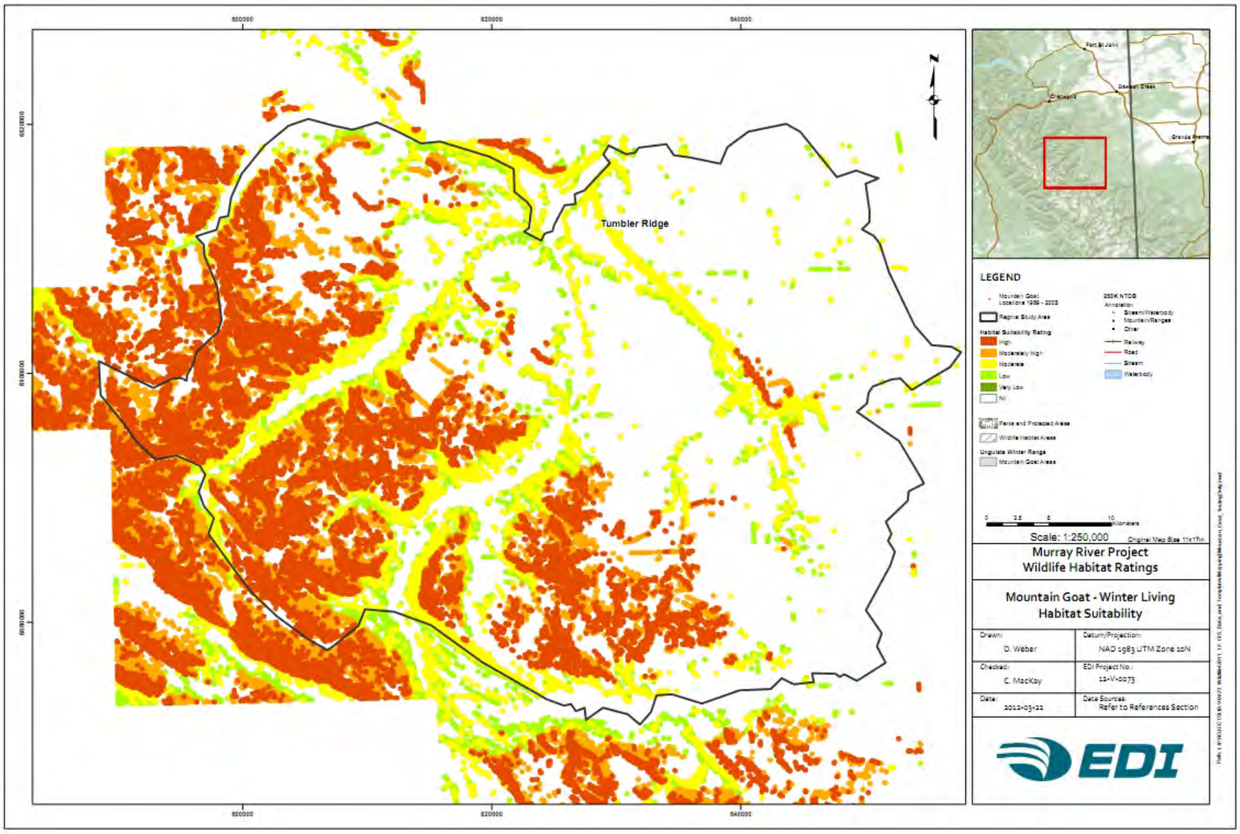

Figure 7. Example of mountain goat habitat suitability ratings if a 200 m "proximity to escape terrain" buffer was added to the model. Most of the mountainous habitat would be rated as 1 or 2 if this buffer was applied.

Table 10. Quantifiable ecosystem attributes for mountain goat.

Season / Life Requisite	Ecosystem Attribute
All Seasons / Living	Escape Terrain: Proximity to escape terrain is the most important attribute that determines habitat suitability for mountain goats. Considering the range of suitable slopes reported in various B.C. studies, we used 30^0 – 60^0 to delineate the highest rated habitat in the RSA. This range is a conservative approach to include all slopes that are most suitable as escape terrain.
Winter / Living	Elevation: Mountain goats are primarily found within 500 m of tree line in winter (Poole and Heard 2003). This corresponds to a minimum elevation of approximately 1200 m for winter use in the RSA. This is based on assessment of TRIM contours spatial data and biogeoclimatic data that shows alpine areas. Aspect: South facing, warm aspects on windswept alpine ridges, rock outcroppings and forested areas are reported to be selected in winter (Wilkinson 2000, Scheck *et al.* 2006). Warm aspects are south to west facing aspects: 134^0 – 285^0 (Scheck *et al.* 2006). • Escape terrain was assigned a rating of 1 if it occurred on warm aspect and 2 if it occurred on cool aspects. • Canyon goats are known to occur in the study area (Scheck *et al.* 2006). Canyon goats refer to goats that use escape terrain in low elevation areas down to river valleys. Therefore, escape terrain that occurred at elevations lower than 1200 m was assigned a rating of 3 if it occurred on a warm aspect, 4 if it occurred on a cool aspect. • All other terrestrial area within the RSA is assigned a category of 5.
Growing / Living	Elevation: Typically, goats reside above tree line during the growing season (Wilson 2005, Wilkinson 2000). Aspect: Selection for aspect in the growing season was not consistently reported in the literature and field verification results indicated aspect was not a strong influence on growing season mountain goat locations. • Escape terrain in both warm and cool aspects above 1200 m elevation is assigned a rating of 1. • Low elevation escape terrain cannot be ruled out and so <1200 m elevation escape terrain with cool or warm aspects are assigned a suitability category of 4. • All other terrestrial area within the RSA is assigned a category of 5.

4.4 MOOSE

4.4.1 Distribution, Threats and Status within the RSA

Distribution

In B.C., moose are widespread and abundant throughout most of the province with the exception of the interior grasslands and the Pacific coastal islands (Rea and Child 2007). They are primarily a forest-dwelling species and are most common in boreal forest habitats (Shackleton 1999). In 2000, the provincial population estimate for moose was approximately 170,000 animals and over 70% of this population lived in northern B.C. (Blood 2000).

The MRP Regional Study Area occurs within one of the areas of highest moose abundance in the province (Rea and Child 2007). The RSA is located within wildlife Management Unit (MU) 7-21 of the Peace Region. An estimated 40,000 to 80,000 moose reside in the Peace Region (Hatter 1998 in Rea and Child 2007). Within the MU, total population was last estimated at 2,044 moose[21] and the moose density was 0.30 moose/km^2 (Rowe 2006).

Moose in the foothills area of the Peace Region migrate between high elevation summer habitats and lower elevation winter habitats (Goddard 2003, WCCC 2010). However, extremely high elevations such as Alpine Tundra (as high as 1500 m, Goddard 2003), are generally avoided due to the lack vegetation and tree cover (Rea and Child 2007). All biogeoclimatic units that occur in the RSA contain suitable habitat, and depending on season, all of the elevational ranges exhibited in the RSA are suitable habitat unless there is an existing habitat limitation. Examples of a habitat limitation would be lack of suitable forage and vegetation, human activity, or deep snowpack (Rea and Child 2007).

Threats and Status

Moose is not a listed species by COSEWIC and is globally assessed as widespread, abundant and secure (BC CDC 2011, Table 11). In B.C., it is yellow-listed or not at risk and is not an identified wildlife species. There are no designated ungulate winter ranges for moose within the RSA; although, there is an UWR (U-9-001, SPE-023) for elk, mule deer and moose near the RSA north of Bullmoose Creek. Bullmoose Creek enters the Wolverine River north of the RSA.

Moose was selected as one of the six species for habitat suitability ratings due to its socioeconomic value to the region through subsistence and recreational hunting. Currently, MU 7-21 is a “moderately hunted” management unit (Rowe 2006). The overall population trend of moose in the Peace Region appears variable, with some reports of population declines (Rea and Child 2007).

Threats to moose populations come from both natural and human-caused sources. Winter weather severity, predation and disease can all have a significant effect on moose populations. However, within managed

[21] +/-19% at 90% confidence

populations, hunting is usually the major cause of mortality (Rea and Child 2007). Land development and industrial activity can have both positive and negative effects on moose and their habitat. When mature forest habitats are replaced by early seral habitats, the quality of moose habitat can increase due to increased amounts of woody browse (Eastman 1977, Westworth *et al.* 1989). However, development can also present a threat to moose populations through impacts to important habitat features such as mineral licks, calving sites, aquatic or semi-aquatic feeding areas, travel corridors or mature forest edges that provide shelter and security (Rea and Child 2007, Wall *et al.* 2011). Additionally, the development of resource roads and other linear corridors can lead to increased mortality of moose through vehicular collisions (Child *et al.* 1991) and increased hunting pressure to the local moose population (Rea and Child 2007). Disturbance by human activities such as recreation, hunting, snowmobiling and using other machinery can also be a stressor if it displaces animals to less suitable habitats (Colescott and Gillingham 1998); however, moose have been shown to habituate to regular human activity (Westworth *et al.* 1989).

Table 11. Status of moose (*Alces alces*) (BC CDC 2011).

Species Code	M-ALAL[22]
Provincial Status	S5 - demonstrably widespread, abundant, and secure
B.C. List	Yellow
Identified Wildlife (Y/N)	N
COSEWIC Status	N/A
Global Status	G5 = demonstrably widespread, abundant, and secure

4.4.2 Habitat Requirements & Habitat Suitability Ratings

Introduction

To meet the objectives of this study, moose habitat was assessed for the generalized life requisite "living" at a two-season level. This was appropriate given the level of information on the species requirements within the RSA and the degree to which moose habitat for various life requisites can be separated. The living requisite primarily depends on both security requirements and forage. Habitat selection by moose in all seasons is a balance between the presence of suitable forage with cover and other influences such as predation, human activities and snow cover (Rea and Child 2007).[23] In this study, we assessed the living requisite in two seasons: winter and growing.

Habitat Requirements

Moose are generally browsers that eat tree and shrub leaves and shoots, deciduous and coniferous leaves, and twigs year-round (Rea and Child 2007). Twigs are especially consumed in the winter months; however,

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[22] The accepted RISC code for moose is ALAM; however, the Integrated Taxonomic Information System (ITIS) accepts *Alces alces* as the species name for moose. Therefore, the code used by this study is ALAL.
[23] Other influences include seasonal requirements, competition, climate, pathogens and insects (Rea and Child 2007).

if available, fallen leaves are preferred over twigs due to their higher nutritional value (Rea and Child 2007). The primary winter forage is willow; however, other winter forage species include red-osier dogwood, balsam poplar/black cottonwood, paper birch, trembling aspen, Saskatoon, highbush-cranberry, false box and subalpine fir. Bark stripping of aspen, willow, and balsam poplar also occurs in the winter (Rea and Child 2007). In late winter, forage may shift to coniferous trees such as subalpine fir as snow depth increases. Preferred growing season forage includes leaves of shrubs, herbs and aquatic vegetation such as horsetail, burweed, and submerged pondweed (Saxena and Bilyk 2000).

To access their preferred forage species, moose use a combination of both stable and transitory habitats. Stable habitats can be expected to provide shrubby browse over the long term and include high elevation shrub communities and riparian areas along watercourses. Transitory habitats are those areas of forest in early stages of regeneration due to having been disturbed by natural (e.g. fire, beaver activity) or human (e.g. timber harvesting, land clearing) agents, and therefore, can provide an abundance of shrubby and herbaceous forage until the stand reaches a more mature structural stage (Rea and Child 2007).

Winter

In the Peace Region, winter habitat tends to be shrubby areas of valley bottoms and low to mid elevation forest stands in an early to mid-seral stage (Goulet and Haddow 1985 in Goddard 2003). In this region, a number of moose population surveys have used an elevation of 1200 m as the upper limit for winter survey (Walker *et al.* 2007 [northern Williston], Demarchi 2000 [northern Williston], Heard *et al.* 1999 [Prince George region]). MacKay (2008) used an upper elevation limit of 1300 m for a population survey conducted in the Cariboo Region and Goddard (2003) suggested an upper elevation limit of 1500 m based on a number of regional studies. However, based on a personal communication with S. McNay and D. Heard, Demarchi (2000) concluded that suitable winter habitat in the Peace Region occurs predominantly at elevations below 1200 m with areas above 1200 m supporting only very low population densities. Preferred winter habitats include riparian and alluvial shrubby areas, burns, regenerating cutblocks and wetlands (Goddard 2003). Areas of gentle slopes, exposed southerly slopes with birch and willow and aspen stands and a favourable snow pack are preferred (Rea and Child 2007, Poole and Stuart-Smith 2006). Dense forest stands are also selected for shelter, food and predator avoidance (Coady 1974, Rea and Child 2007).

In winter, snow depths exceeding 70-100 cm restrict movements of moose as does wet, dense or crusted snow (Rea and Child 2007). Annual snowfall in the BWBSmw and BWBSwk1 is a range between 110 and 332 cm with averages of 156 cm and 241 cm each (Delong *et al.* 2011). In the SBSwk2, the annual snowfall ranges from 210 to 1075 cm and averages 786 cm (Delong 2004). The ESSF can receive up to 220 cm of precipitation annually with 50-70% of this amount accumulating as snow. It is common for the maximum snowpack to range from 100 to 400 cm (Coupé *et al.* 1991). Moose generally leave the ESSF during winter due to the deep snowpack, but are common in the BWBS and SBS. In particular, the BWBS is important overwintering habitat for ungulates (Meidinger and Pojar 1991, Goddard 2003). Most ideal habitats include both forage and shelter within close proximity to each other. For example, disturbed areas with regrowth of browse species, which are primarily shrubs of structural stage 3a and 3b, associated with nearby mature stands provide both forage and cover (WCCC 2007b). In years of low snowfall accumulations, moose that utilize mid-elevations in mountainous areas or subalpine habitats in the summer months may remain in these areas during the winter (Rea and Child 2007, Goddard 2003). During winter, moose are most likely to be found within the BWBS and SBS biogeoclimatic zones, while the ESSF may provide less suitable winter habitat as suggested by a number of studies in the Peace Region (Goddard 2003).

The winter season provincial benchmark for moose is the Boreal White Spruce-Trembling Aspen (BA/1) broad ecosystem unit of the moist warm subzone of the Boreal White and Black Spruce biogeoclimatic zone (BWBSmw). This unit is within the Peace Lowland (PEL) ecosection of the Boreal Plains. The provincial benchmark is assigned a rating of "1" and provides a comparison against which habitats within the study area were rated (MELP 1999).

Growing Season

Moose are less limited in the growing season and their habitat covers a broader area. Moose summer habitat typically includes shrublands and riparian areas. Some moose move upslope to alpine fir thickets, while others may remain in valley bottoms year round (Rea and Child 2007). Wetlands, beaver ponds and lakes are often visited in the growing season to access aquatic vegetation (Rea and Child 2007).

The growing season provincial benchmark for moose is the White Spruce-Balsam Poplar Riparian (PR/1) broad ecosystem unit of the moist warm subzone of the Boreal White and Black Spruce biogeoclimatic zone (BWBSmw). This unit is within the Peace Lowland (PEL) ecosection of the Boreal Plains. The provincial benchmark is assigned a rating of "1" and provides a comparison against which habitats within the study area were rated (MELP 1999).

Habitat Suitability Ratings

Since the level of knowledge concerning moose is fairly high, the 6-class Habitat Suitability Rating Scheme was used: 1 (High), 2 (Moderately High), 3 (Moderate), 4 (Low), 5 (Very Low), 6 (Nil). Ratings were assigned to ecosystem units within the RSA based on their relative quality compared to the provincial benchmarks for moose living in winter and living in the growing season.

An abbreviated summary of the ecosystem attributes associated with the selected life requirements for moose is provided in Table 12. In the RSA, structural stage 3 was considered optimal to provide moose browse and structural stages in the range of 3 to 5 were assumed to provide good conditions in terms of high amounts of shrub species preferred by moose. The differences between summer and winter ratings were primarily a function of elevation. Ecosystem units that occurred at elevations less than 1500 m were generally rated between 1 and 5 in winter[24] and elevations higher than 1500 m, that is alpine and parkland habitats, were rated 6 for winter. In summer, generally only barren ecosystem units at any elevation were given nil ratings. Summer habitat was considered to extend to higher elevations, and select alpine habitats were assigned ratings as high as 3.

[24] Some exceptions apply, for example, ecosystem units representing water and low elevation forested ecosystems in herb structural stage were assigned nil ratings.

Winter ratings for forested ecosystem units ranged from 1 to 6 depending on site series, structural stage, and elevation. Site series described types and abundance of shrub species and were rated higher if they contained suitable browse. BWBS subzones were rated higher overall (ratings = 1 – 5) than SBS subzones (2 – 5) due to the snow-limiting nature of the SBS on moose habitat use in winter. ESSF units were rated 5 – 6 reflecting low use of higher elevations in winter.

Use of higher elevations in the growing season by moose was reflected in that ratings in that alpine and parkland units ranged from 3 to 5 and 2 to 5, respectively. Summer ratings for forested ecosystem units followed a similar pattern to winter ratings. BWBS subzones were rated higher (1 - 5) overall than SBS subzones (2 - 5). ESSF subzones ratings reflected relatively higher use in the summertime and were generally ranged between 3 and 5.

Table 12. Quantifiable ecosystem attributes for moose (modified from Saxena and Bilyk 2000).

Season	Life Requisite	Ecosystem Attributes
Winter	LI	• low elevation valley bottom and low to mid elevation forest stands in an early to mid seral stage and riparian and alluvial areas, burns, cutblocks, wetlands are selected year-round • elevations greater than 1500 m will have nil value to moose in winter • transitional elevations of 1000-1500 m will have limited value, depending on the stage of winter and severity of snowpack • tree and shrub leaves and shoots, deciduous and coniferous leaves and twigs are eaten year-round • fallen leaves are preferred in winter months, until they are no longer available • twig forage is important in winter • winter forage species: willow, red-osier dogwood, balsam poplar/black cottonwood, paper birch, trembling aspen, Saskatoon, highbush-cranberry, false box, subalpine fir • gentle slope • exposed southerly aspects • snow depths not exceeding 70 cm • primarily SBS and BWBS biogeoclimatic zones
Growing	LI	• low elevation valley bottom and low to mid elevation forest stands in an early to mid seral stage and riparian and alluvial areas, burns, cutblocks, wetlands are selected year-round • tree and shrub leaves and shoots, deciduous and coniferous leaves and twigs are eaten year-round • preferred forage includes leaves of shrubs and herbs and aquatic vegetation (e.g. horsetail, bur weed, submerged pondweed) • species in wetlands are an important source of forage (e.g. horsetails, sedges, pondweed, bur weed, yellow water lily and water arum) • increased use of high elevations (i.e. ESSF, BAFA) compared to winter season, but some moose remain in valley bottom floodplains year-round • all SBS and BWBS habitats used extensively

4.5 GRIZZLY BEAR

4.5.1 Distribution, Threats and Status within the RSA

Distribution

Grizzly bears are distributed widely throughout B.C. with the exception of many coastal islands where a resident population of the species is unrecorded, including Queen Charlotte and Vancouver Islands. In B.C., grizzly bear range extends across northern British Columbia, southward to the Coast Mountains to about Jervis Inlet and down through the Rocky, Purcell and Selkirk Mountains to the U.S. border (B.C. Government 1995). They have been extirpated through much of the southern interior and Peace River regions of B.C. They are found in all biogeoclimatic units except BG (Bunchgrass) and CDF (Coastal Douglas-fir). Grizzly bears are wide-ranging in the types of ecosystems that they utilize, occurring in most broad ecosystem units and across a large gradient of elevations, from sea level to alpine tundra (MWLAP 2004c).

Provincially, the population for grizzly bears is estimated to be between 10,000 and 13,000 (MELP 1995). Grizzly bears found within the RSA are members of the Hart Grizzly Bear Population Unit (GBPU), which is 19,661 km^2. In 2004, the population estimate for the Hart GBPU was 386 individuals, with a density of 20 bears per 1000 km^2 (Hamilton *et al.* 2004). The current population is 71% of the habitat capability estimate for the area (Hamilton *et al.* 2004).

As with most species, home range size in grizzly bears is negatively correlated with general habitat quality (COSEWIC 2002b). Although no data are available to describe the ranges of grizzly bears in the RSA, the conclusions of a recent neighbouring study on habitat use by mountain bears may have application (Ciarniello *et al.* 2003). This research reported on bear habitat use for bears living in two separate landscapes and referred to them as plateau and mountain bears. The mountain landscape more readily applies to the RSA. In the Parsnip Grizzly Bear Project, Ciarniello *et al.* (2009) found that female mountain bears had an average home range of 58 km^2 (S.E.=8, N(home-ranges)=16). Male mountain grizzlies had an average home range of 672 km^2 (SE=153, N(home-ranges)=4).

Threats & Status

Grizzly bears are divided into two populations: the northwestern population which is listed as Special Concern and the prairie grizzly bear population which has been extirpated from Alberta, Saskatchewan and Manitoba (COSEWIC 2002b). In British Columbia, grizzly bears are on the provincial blue-list (BC CDC 2011, Table 13). Grizzly bears appear to be limited primarily by human-caused mortality from a variety of factors, and secondarily by habitat loss, alienation and fragmentation (Ciarniello *et al.* 2004; COSEWIC 2002b).

Most grizzly mortalities are from human activities, including legal harvesting, control killing for threatening human habitation or property, self-defense and poaching (McLellan *et al.* 2000; COSEWIC 2002b). Grizzly populations are limited entry hunted in most areas in Canada and licensed hunters kill over 450 grizzly bears each year (COSEWIC 2002b). Another 100 are known to be killed by other human causes and substantial numbers are killed and not reported. In British Columbia, grizzly bear hunting is limited by the number of hunting authorizations issued to resident hunters through a random draw, known as Limited Entry Hunting (LEH), and by quotas issued to guide outfitters for either resident or non-resident hunters (Austin *et al.* 2004). In the Peace Region, grizzly bear may be legally harvested by LEH in the spring from mid-April to mid June and in fall from mid August to end of October (MOE 2010b). Three authorizations were released for the spring season of 2011 for Wildlife Management Unit 7-21 within the RSA.

Human-caused mortality is exacerbated by increased levels of access (McLellan 1990; Mace *et al.* 1996). Literature reports that roads impact grizzly bears and that their use of habitat is constrained by roads. Studies have identified that the majority of grizzly deaths were caused by humans and occurred within 500 m of a road (Ciarniello *et al.* 2004; Summerfield *et al.* 2004). The effect of roads on grizzly bears has been debated. McLellan and Shackleton (1988) found that grizzly bears avoided even lightly-used roads, utilizing habitats within 100 m of roads less than expected. Conversely, other research has found that grizzly bears will utilize roaded habitats, although avoidance will increase in relation to ease of public access (e.g. open, restricted or closed, Wielgus *et al.* 2002) and amount of traffic (Mace *et al.* 1996).

Habitat loss, alienation and fragmentation also threaten grizzly bear populations in B.C. Human development often causes direct loss of preferred valley-bottom habitat (MWLAP 2004c) as well as habitat fragmentation by isolating islands of preferred wilderness habitat (Proctor *et al.* 2002). The fragmentation of habitat has been noted as a threat to grizzly populations, by limiting movement of grizzly bears across the broader landscape.

Regionally, the Hart GBPU is considered viable (Hamilton *et al.* 2004), although it is near the threshold for habitat effectiveness to support the current population (Johnstone 2004). As a result, the population is at risk of falling from the status of “viable” to “threatened”. According to Johnstone (2004), the most substantive risk to the population is associated with improved access resulting in displacement of bears, increased hunting opportunities and poaching.

Table 13. Status of grizzly bear (*Ursos arctos*) (BC CDC 2011).

Species Code	M-URAR
Provincial Status	S3 – Special concern, vulnerable to extirpation or extinction
B.C. List	Blue
Identified Wildlife (Yes/No)	Yes
COSEWIC Status	Special Concern
Global status	G4 = Uncommon but not rare; some cause for long-term concern due to declines or other factors.

4.5.2 Habitat Requirements & Habitat Suitability Ratings

Introduction

Grizzly bears are large omnivores that occupy a wide variety of habitats in British Columbia. As habitat generalists, grizzly bears can be found in habitats as diverse as temperate coastal rainforests and semi-desert arctic tundra.

Most grizzly bears in the interior portions of British Columbia occupy mountainous areas and rely on a variety of alpine and valley bottom habitats for food. Grizzly bears have a very broad diet, spending most of their time eating vegetation and fruits, such as berries, roots and corms and fresh shoots, but will also eat carrion, salmon, deer, moose, rodents and insects (COSEWIC 2002b; Zager and Jonkel 1983). Unlike grizzly bear populations along Pacific watersheds, grizzly bears in the Peace River drainage do not have ready access to spawning salmon to include as part of their diet (Ciarniello *et al.* 2003). Most grizzly bears eat primarily vegetation and berries, and their habitat associations are therefore strongly seasonal, reflecting local plant development. In mountainous regions, such as those found in the RSA, the variation in local plant development associated with varying elevation results in seasonal elevational migrations (Ciarniello *et al.* 2003). In berry season, some mountain bears made extended movements from their 'core' home ranges to burned over areas, such as those surrounding Hook Lake which contained abundant soapberry (*Shepherdia canadensis*) and blue berries (*Vaccinium membranaceum and V. ovafolium)*

Despite some variability, general patterns have been documented in the literature for seasonal habitat use of interior grizzly bear (McLellan and Hovey 2001; Ciarniello *et al.* 2003; Zager and Jonkel 1983). Seasonal movements of grizzly bears are based on food availability although these movements are highly variable and often dependent on other factors such as sex, age and social status. McLellan and Hovey (2001) observed interior grizzly bears denning within mountain habitat, traveling to plateau or flatland areas upon den emergence during the spring, foraging in a variety of habitats during the summer, and then moving back to the alpine and subalpine areas during berry season. Ciarniello *et al.* (2005) found that bears that lived in the mountains also denned in the mountains. Dens occupied by mountain bears were excavations into sloping ground or natural caves and tended to be placed at higher elevations. Very few dens were located in the mountain valley bottoms (Ciarniello *et al.* 2005). In Ciarniello *et al.* (2005), none of the mountain bears were recorded emerging from their dens and travelling to the plateau as recorded by McLellan and Hovey (2001). Instead, mountain bears denned for a longer duration than their plateau bear counterparts and remained within the mountains at den emergence.

Based on the distribution and observed use of habitats from other interior grizzly bear studies (McLellan and Hovey 2001), and more specifically, studies conducted in the adjacent Parsnip River (Ciarniello *et al.* 2003), seasonal habitat use for mountain grizzly bears are expected to show the following general trends:

Hibernating – hibernation dens in alpine and subalpine areas

Spring – snow-free areas found in lower elevation valleys, south facing aspects and avalanche chutes to feed on emergent vegetation

Summer – later-melting slopes (mid-elevation herbaceous habitats and north slopes) to take advantage of newly emerging more succulent vegetation, young seral-stage openings (e.g. burns) for berries and subalpine and alpine meadows with Sitka valerian and rodents

Fall – young seral-stage openings (e.g. burns) for late berries and ants in burned stumps, open alpine herbaceous slopes for roots and rodents and carrion when available

In our study, the life requisites that were rated for grizzly bear reflect the expected seasonal habitat use, including: LI-P (living in spring[25]), LI-S (living in summer[26]), LI-F (living in fall[27]) and HI (hibernating). Living requisites (LI) that incorporate both feeding and security requirements were chosen for rating rather than rating habitats separately for these requirements. Our rationale is that it is more likely that grizzly bear habitat use is based on a favorable combination of features with an emphasis on forage but including elements of cover for security and bedding.

Hibernating

In a study adjacent to the RSA, dens tended to be in alpine areas at mid to upper elevations and were most often excavations in sloping ground (Ciarniello *et al.* 2005). In addition to excavated dens, natural cave dens are also noted as being important den sites and especially important as natal den sites for mountain-dwelling grizzly bears. Bears that lived in the mountains in the Parsnip River Grizzly Bear Study typically selected dens at elevations that ranged from 973 m to 1,824 m with a mean of 1,484 m (Ciarniello *et al.* 2003). Investigated dens in the mountains were primarily located in the alpine, followed by the upper reaches of the Engelmann spruce–subalpine fir zone (Ciarniello *et al.* 2005). Unlike studies that found grizzlies denning in the alpine, then travelling to lower elevations during non-denning periods (McLellan and Hovey 2001),

[25] The spring season includes the months of May and June as defined for the Subboreal Interior ecoprovince per the Chart of Seasons by Ecoprovince (RISC 1999).
[26] The summer season includes the months of July and August as defined for the Subboreal Interior ecoprovince per the Chart of Seasons by Ecoprovince (RISC 1999).
[27] The fall season includes the months of September and October as defined for the Subboreal Interior ecoprovince per the Chart of Seasons by Ecoprovince (RISC 1999).

mountain bears in this region were found to den in the mountains and then stay in the mountains during non-denning periods (Ciarniello *et al.* 2005).

Some research has found that grizzly bears avoided human activity areas, including roads and industrial activity, for den-site selection; bears selected for den sites at distances of 1–2 km from those areas (Linnell *et al.* 2000). Although impacts on denning habitat areas were relatively low when examined for grizzly bears found in the mountainous regions in the Parsnip River Grizzly Bear Study, increased mining and oil and gas developments may affect alpine denning habitat and the expansion of forest road networks may also result in increased access by motorized winter recreationists (Ciarniello *et al.* 2005).

Table 14 describes specific ecosystem attributes that provide for each of the grizzly bear life requisites rated by this study.

Spring

In the spring, grizzly bear feed primarily on emergent vegetation on south facing aspects and in avalanche chutes where snow is early to clear and soils are well developed. In south-eastern B.C., grizzlies were found to utilize lower elevation valley bottoms and avalanche chutes after emerging from their dens (McLellan and Hovey 2001). Results from the Parsnip River Grizzly Bear Study were somewhat similar although mountain bears in the Parsnip River study area did not move into forested environments tending to remain in alpine meadows and avalanche chutes (Ciarniello *et al.* 2003).

After emerging from their dens, grizzly bears spend most of their time in the spring foraging, feeding primarily on herbaceous forbs and grasses. Bears in the Parsnip River Grizzly Bear Study were observed feeding with high intensity on fireweed, common horsetail, glacier lily, alpine hedysarum, cow parsnip, bracted lousewort, Sitka valerian, bromes, sedges and blue grasses. Carcasses and moose (adults and calves) were also noted as being fed on with high intensity during the spring season on the plateau (Ciarniello *et al.* 2003).

Overall, mountain bears have shown a tendency to use the snow-free lower elevation portion of subalpine and alpine meadows in the spring, following the snowmelt up the mountain as the season progresses, thus tracking the early phenological stages of vegetation (Ciarniello *et al.* 2003). Based on field research in the Hart Ranges, grizzly bears found in the mountains used habitat at a mean elevation of 832.5 m, with a range of 677 to 1,092 m. Despite feeding at lower elevations during the spring, grizzlies in the Hart Ranges still had a strong preference for non-forested areas and were seldom recorded in valley bottoms with old-age forested stands.

Summer

In the mountains, summer feeding areas are the most variable of the seasonal habitats and the habitats that are used are dependent on factors such as food availability, sex, reproductive status, age of the bear, competition from other bears and interactions with humans. During the summer season, Ciarniello *et al.* (2003) reported that some mountain bears made extended movements to access large burned over areas.

For the majority of these bears this was the only time extended movement outside of their 'core' home range was recorded. Other mountain bears were not recorded to have made these extended movements in summer but rather remained to continue to take advantage of later emergent vegetation, moving to cooler aspects and higher elevations (Ciarniello *et al.* 2003), similar to southeastern B.C. bears (McLellan and Hovey 2001). During the summer, grizzly bears were recorded in the Hart Ranges and foothills, and were recorded at locations ranging from 1,024 to 1,732 m, with a mean elevation of 1,360. Areas of use tend to be non-forested, utilizing krummholz subalpine fir/slide alder/rhododendron communities, alpine meadows or young seral-stage openings, such as burns and cutblocks. The selection for young-age landscapes within the mountains is a reflection of bears moving to burns that produced an abundance of blueberries (*Vaccinium sp.*), soapberry (*Shepherdia canadensis),* and opportunities to forage on ants.

Common plant food items that are utilized during the summer include bracted honeysuckle, devil's club, soapberry, black huckleberry, velvet-leaved blueberry, glacier lily and white clover. Other food items that were used intensely during the summer include ants and microtines (Ciarniello *et al.* 2003). Most feeding on ants consists of ripping apart dead wood, flipping rocks and logs to reveal the ants.

Fall

Grizzly bear continue to utilize non-forested high-elevation alpine habitats into the fall, similar to those used in the summer. Unlike bears that migrate to valley bottoms during the fall to feed on spawning salmon, grizzly bears in the arctic drainage tend to be at higher elevations during the fall. The mean elevation of mountain grizzly bears in the Parsnip River Grizzly Bear study during the fall was 1,462 m, with a range between 1,226 to 1,824 m, slightly higher than during the summer months (Ciarniello *et al.* 2003). Similar to summer, grizzlies will feed on a range of foods such as berries, roots, insect larvae, herbaceous plants, grasses and sedges (McLellan and Hovey 2001, Ciarniello *et al.* 2003). In the mountains, foraging tends to be focused intently towards digging for the bulbs of glacier lily, *Hedysarum*, and to a lesser extent mountain sorrel. Bears will also dig for rodents. Bears will continue to feed on berries in the fall, however, in the mountains, a lot of the berries will have already turned. For those bears that focus on feeding on berries, they frequently use early-seral stage forest openings, particularly old burn sites and cutblocks. Intense bouts of feeding on ants and their larvae occur until the first hard frost (Ciarniello *et al.* 2003).

Habitat Suitability Ratings

The objective of this study was to document all valuable habitat and its relative quality to any life requisite of the selected species; generalized life requisites such as living in the spring season were deemed sufficient to meet this objective given the level of information on the species requirements within the RSA while ensuring that important life stages with specific habitat requirements were rated (MELP 1999). Since the level of knowledge concerning the habitat requirements of grizzly bear in B.C. is well documented, the 6-class Habitat Suitability Rating Scheme was used: 1 (High), 2 (Moderately High), 3 (Moderate), 4 (Low), 5 (Very Low), 6 (Nil).

Usually, ratings are assigned to ecosystem units based on their relative quality compared to the provincial benchmarks for the species' habitat. However, the provincial benchmark for grizzly bear has not been established. In lieu of a provincial benchmark, relative ratings were assigned in context with data from Hamilton *et al.* (2004). B.C. Grizzly Bear Population Units (GBPUs) known to contain the highest habitat capability density are Flathead in the southeast corner of B.C. and Khutzeymateen on B.C.'s north coast. Both of these GBPUs have double the habitat capability density compared with the Hart GBPU. Of these two GBPUs, the Khutzeymateen is less comparable to the Hart Population as the Khutzeymateen area is characterized by large salmon-bearing river systems. Thus, for the purposes of this species account, the provincial benchmark for grizzly habitat would be the Flathead GBPU.

Generally, ratings were assigned for grizzly bear habitat as follows. In spring, areas expected to green up first were given the highest ratings. Ecosystem units such as the alpine and parkland were given very low (5) and nil (6) ratings as high elevation and snow depths are expected to delay green up until the summer months. The ESSF is also high elevation and expected to retain snow through the spring time and therefore were given ratings of low (4). Remaining units in the BWBS and SBS were rated based on being among the first areas to green up. These habitats are expected at lower to mid elevations with sparse forest canopies or open meadows and likely in younger structural stages. Consequently, structural stage 2 to 3 and site series expected to be on warm aspects were rated higher. Regional field guides were used to select drier site series to indicate likely south-facing ecosystem units. Dry ecosystem units with suitable forage species were rated highest.

Summer living habitat includes both forested and unforested sites and ratings by ecosystem unit depended on availability of forbs/grasses used as forage. Alpine and parkland habitats were rated high (1) to moderate (3) depending on whether succulent vegetation such as Sitka valerian was expected. Regional field guides' plant lists were used to rate each site series accordingly. Wetlands were also rated moderately high (2) to low (4). In the forested ecosystem units, younger structural stages (2 and 3) were rated higher than the older structural stages of the same unit to reflect preference for burns and regenerating blocks.

Fall ratings were similar to summer ratings. But for forested sites, higher ratings were given to berry-producing ecosystem units. Field guides were used to select these site series. Structural stage 2 (herb) was rated lower and often structural stage 3 (shrub) was rated higher than more mature structural stages to demonstrate the emphasis on berry-feeding. Again, alpine and parkland habitats were generally rated high (1) to low (4) depending on the types of vegetation expected.

For the hibernating life requisite, alpine and ESSF parkland were rated highest. All structural stages were rated the same in these zones. Lower elevations (SBS, BWBS and non-parkland ESSF) were rated 5 or 6 for hibernating.

Table 14. Quantifiable ecosystem attributes for grizzly bear (modified from Saxena and Bilyk 2000).

Season	Life Requisite	Ecosystem Attributes
Winter	HI	• subalpine krummholz, parkland, alpine tundra • natural caves for natal dens, when available
Spring	LI	• south-facing slopes with well developed soil • lower elevation valley bottoms with open forest canopies • south-facing herbaceous avalanche tracks cleared of snow
Summer	LI	• subalpine meadows and alpine tundra excluding rock, ice and snow, predominantly alpine meadows, herb fields and grasslands • krummholz subalpine fir/slide alder/rhododendron communities • early-seral stage openings (i.e. burns and cutblocks) with high berry production • herbaceous and shrubby avalanche tracks, especially north-facing
Fall	LI	• alpine tundra excluding rock and ice, meadow, herb fields and grasslands predominantly • young-seral stage openings (i.e. burns and cutblocks) with high berry production

4.6 FISHER

4.6.1 Distribution, Threats and Status within the RSA

Distribution

Fishers (*Martes pennanti)* are found only in North America and occupy coniferous and mixed deciduous-coniferous forests across most of Canada and disjunct parts of the United States. Throughout their range, fishers occur in low numbers, and the species is relatively less abundant in western Canada compared to eastern populations (Proulx *et al.* 2004, Hatler *et al.* 2008). In B.C., fisher can occur throughout the mainland regions of the province, but are very rare throughout much of the southern interior and west of the Coast Mountains; the majority of the provincial population is found in the central interior and northeast regions of the province (Lofroth 2004, Hatler *et al.* 2008). The current population estimate for B.C. is between approximately 1,400 and 3,700 individuals (Lofroth 2004).

Fishers occupy low to mid-elevation forested habitats, typically avoiding open areas (Weir and Almuedo 2010). Throughout their range, they can be found at elevations up to 2,500 m, but the majority are found below 1,000 m (Powell and Zielinski 1994). In B.C., they are most commonly found in variants of the Boreal White and Black Spruce (BWBS), Interior Douglas-fir (IDF), Montane Spruce (MS), Sub-boreal Pine-Spruce (SBPS) and Sub-boreal Spruce (SBS) biogeoclimatic zones, with the highest densities in the BWBSmw, IDFdk3, IDFdk4, SBPSmc, SBPSxc and SBSdw subzones (Weir and Almuedo 2010).

The Peace Region, in particular, the southern Peace Region, is believed to be one of the most productive areas for fisher in B.C. (Lofroth 2004, Weir *et al.* 2011). As of 2003 the abundance of fisher within the Peace was estimated at 548 - 1,300 adult individuals (Weir 2003). Habitat capability mapping for the province has designated the southern Peace Region as an area of *Very High* and *High* habitat capability for fisher with estimated densities of 9.6 to 20.6 and 6.6 to 15.4 fishers/1,000 km^2, respectively (Lofroth 2004). These estimates are consistent with the results of research conducted by Weir *et al.* (2011) in the Kiskatinaw Plateau and Peace Lowlands ecosections (to the south and west of Dawson Creek, an area designated as *Very High* capability by Lofroth 2004), which found an average density of 18.4 fishers/1000 km^2 in early winter and 16.3 fishers/1000 km^2 in late winter in the boreal mixed-wood forests of the BWBSmw biogeoclimatic zone. In comparison, research by Weir and Corbould (2006) in the SBS biogeoclimatic zone in the Williston Reservoir area of the Omineca Region (an area designated as *High* capability by Lofroth 2004) found an average density of 11.2 and 8.8 fishers/1,000 km^2, respectively, in the early and late winter. Although this study was outside of the Peace Region, the authors suggest that these estimates are representative of other SBS-zone landscapes in the province.

The MRP Regional Study Area overlaps the Hart Foothills Ecosection within the Canadian Rocky Mountains Ecoregion, and the Kiskatinaw Plateau Ecosection of the Southern Alberta Upland Ecoregion; biogeoclimatic subzones within the RSA include the BWBSwk1, BWBSmw, SBSwk2, ESSFmv2, ESSFmvp, ESSFwc3, ESSFwcp, and ESSFwk2 and BAFAun. Most of the region has been rated as *High* capability for fisher in provincial-level mapping, but it borders areas of *Rare* to *Nil* habitat capability to the west and southwest as it transitions to the Rocky Mountains. Within the RSA, we expect fisher to be found in forested habitats at lower to mid-elevations throughout the study area; specifically, within the BWBS and SBS subzones and possibly the lower areas of the ESSF. Habitat capability is expected to be highest within the BWBSmw, although habitat suitability will depend on the current state of the local ecosystems and the level of anthropogenic disturbance (e.g. forestry, oil and gas development, etc.). Densities within the BWBSmw could potentially be as high as those observed by Weir *et al.* (2011) during the studies near Dawson Creek (average density of 18.4 and 16.3 fishers/1000 km^2 in early and late winter, respectively).

Threats & Status

Globally and nationally, fisher populations are considered widespread and secure; however, within British Columbia there is more concern due to local extirpations in the southern interior of the province and overall lower densities as compared to eastern populations (Banci 1989, Weir 2003). Currently in B.C., fishers are blue-listed (Table 15) indicating that they are a species of Special Concern within the province. Fisher are also provincially designated as “Identified Wildlife” under the Identified Wildlife Management Strategy (IWMS-BC) and the Dawson Creek Land and Resource Management Plan has identified the maintenance of viable and healthy furbearer populations as a regional objective (PRCI 2010).

The primary threat faced by fisher is the loss of forested habitat as a function of anthropogenic change (Proulx *et al.* 2004). Development activities that occur on forested land, such as logging, hydro-electric operations, mining and agricultural land clearing can remove critical habitat for the species (Weir 2003). Due to their strong association with late successional forests, harvest practices which focus on this forest type may have significant impacts on fisher (Weir 2009). Furthermore, forest management practices that suppress disease, death and decay can be detrimental because they prevent processes which facilitate the creation of suitable denning and resting sites (Weir and Almuedo 2010).

In addition to habitat changes, fisher populations also face threats from trapping. Trapping influences population dynamics by altering reproductive and mortality rates and affects local density and spatial organization (Weir 2003, Arthur *et al.* 1989, Powell and Zielinski 1994). These effects may be exacerbated when resource development enables access to new areas for trappers, which can increase mortality rates within populations that were previously acting as source populations (Weir 2003). In the Peace Region, trappers may legally harvest fisher between November 1st and February 15th, although harvests have declined over the past 30 years (Weir 2003, 2009).

Table 15. Status of fisher (*Martes pennanti*) (BC CDC 2011).

Species Code	M-MAPE
Provincial Status	S2S3 – S2 = Imperiled, S3 = Special concern, vulnerable to extirpation or extinction
B.C. List	Blue
Identified Wildlife (Yes/No)	Yes
COSEWIC Status	N/A
Global status	G5 = demonstrably widespread, abundant, and secure

4.6.2 Habitat Requirements & Habitat Suitability Ratings

Introduction

Two categories of habitat requirements were rated for fisher in the habitat model: living all seasons and birthing habitat. In general, life requisites such as foraging, thermal cover and resting habitat characteristics for fisher are inter-related and are required year round; as a result, seasonal habitat use by fisher in the study area was combined for all seasons. The exception to this is the reproduction period, when specific habitat features are required. Assessing the generalized life requisite, "living", at a one-season level, in combination with rating "birthing" was sufficient to meet the study objective.

Habitat Requirements

Fisher is a forest-dwelling species. In the west, they are most commonly associated with older coniferous forests (Hatler *et al.* 2008); however, habitat selection appears to revolve more around forest structure than forest type and a variety of forested habitats may be used (Badry 2004). Important structural features include the presence of coarse woody debris (CWD), snags and thick overhead cover composed of multiple layers (trees, saplings, shrubs, etc.).

Fishers are a medium-sized generalist carnivore. In most areas, snowshoe hare are the most common and important prey item but they consume a large variety of other foods (Hatler *et al.* 2008) and are readily able to switch food sources to adapt to the most available food source (Badry 2004). For example, while dense regenerating forests provide opportunities to catch snowshoe hares, in late successional forests voles and squirrels are more likely food sources (Weir and Almuedo 2010). Other food sources include other small rodents, woodchucks, porcupines, grouse, muskrat, other carnivores such as mink or marten, carrion, and less frequently, vegetation, fish and snakes (Badry 2004, Hatler *et al.* 2008, Weir and Almuedo 2010). The adaptability of the food habits of fisher allows for utilization of variable forest types and for the use of good patches within less suitable stands (Weir and Almuedo 2010). Many important prey species are strongly associated with shrub cover and CWD making these significant aspects of foraging habitat (Badry 2004).

Fisher habitat use is strongly associated with overhead cover. This has generally been believed to be a response to protection from predators (Weir 2003, Weir and Almuedo 2010); although prey species may also be more abundant in these habitats (Hatler *et al.* 2008). Regardless, fishers are usually found in or near forest patches with at least 30% canopy cover and a productive understory (Badry 2004). Areas with little cover, including non-forested wetlands, recent cutblocks, and other cleared areas are generally avoided (Weir and Almuedo 2010); as such, corridors among suitable patches are important habitat features (Badry 2004). Overhead cover is also particularly important in the winter, as fishers are poorly adapted to travelling in deep, soft snow (Raine 1983) and forest stands with a moderate canopy closure of conifers can provide important snow interception to facilitate travel (Weir 2003).

Fishers use a variety of different habitat structures as rest sites throughout the year, which are selected to provide both for protection from predators and thermal cover. The type of structure used will depend on availability and on the ambient temperature; however, typical rest sites include large tree branches or rust brooms, CWD, tree cavities and ground sites. Overall, tree sites (branches, rust brooms, etc.) are preferred; however, at temperatures below -11°C, greater thermal cover is required and can be achieved by taking cover in large logs to capitalize on insulation provided by snow (Weir and Corbould 2008). Specific structural habitat associations for resting are shown in Table 16.

Living – All Seasons

A fisher's home range must provide all of its foraging, thermal and security cover, and resting and reproductive habitat needs throughout the year. Fishers are generally solitary animals and have intrasexually exclusive home ranges. In B.C., fisher home ranges are relatively large compared to other regions. Studies in north-central and north-eastern B.C. have estimated home range size (95% fixed kernel estimate) at 49 km^2 for female fisher and 219 km^2 for male fisher in the SBS biogeoclimatic zone near the Williston Reservoir (Weir and Corbould 2008), and 32 km^2 and 199 km^2 for female and male fisher, respectively, in the BWBS biogeoclimatic zone near Dawson Creek (Weir 2009).

Habitat selection by fisher occurs at several levels, and studies within B.C. have found a variety of attributes that influence habitat selection. In general, fisher habitat selection is positively associated with (summarized from Lofroth *et al.* 2011):

- forested ecosystems (primarily coniferous, but also mixed coniferous/deciduous stands);
- forested stands with 30-60% canopy cover;
- a productive understory, particularly with moderate values of high shrub cover (2-10 m tall);
- increasing volume of CWD, increasing number of pieces of CWD and larger pieces of CWD;
- warm aspects and gentle to moderate slopes, and
- mature and old structural riparian habitats.

In contrast, fisher habitat selection is negatively associated with non-forested habitats including non-vegetated areas, herb and shrub ecosystems and areas that have been recently logged (0-12 years).

Riparian and other moist, rich site series are integral components of the home ranges of fishers (Badry 2004). These forests tend to provide the structural complexity and high levels of coarse woody debris associated with quality fisher habitat, in addition to providing large, old trees specifically used for birthing and rearing. Additionally, corridors among riparian and upland or riparian to riparian habitat areas are key requirements to allow movement among variable patch types within the home range of an individual (Badry 2004, Weir and Almuedo 2010).

Birthing

Reproductive dens are a critical habitat feature for female fishers. In B.C. fishers generally give birth between mid-March and early April (Hatler *et al.* 2008); reproductive dens must provide shelter for the female and her young from adverse weather conditions in the early spring and protection from potential predators. The reproductive den will be used for up to three months during the rearing period, although females will occasionally use up to three different den trees during this period (Weir and Corbould 2008). Females may re-use the same den in successive years (Weir and Almuedo 2010).

In B.C., reproductive dens are found exclusively within the cavities of trees (Lofroth *et al.* 2011); the majority of these trees are live, but declining due to disease or decay (Weir and Almuedo 2010). Researchers in B.C. have found that denning trees must meet very specific criteria: the tree needs to have some form of damage to the trunk (typically through frost cracks, burn scars, or large branches pulling out from the trunk) which provides access for decay organisms to the interior of the tree, this damage must be of particular dimensions to allow the female access to the interior of the tree while restricting access to larger predators, and the tree must be large enough to accommodate an interior cavity >30 cm in diameter (Weir and Corbould 2008, Lofroth *et al.* 2011, Weir *et al.* 2012). Studies in northern B.C. have found reproductive dens exclusively in trembling aspen (*Populus tremuloides*), balsam poplar trees (*Populus balsamifera* spp. *trichocarpa*), and black cottonwood (*Populus balsamifera* spp. *balsamifera)* (Weir and Corbould 2008, Weir *et al.* 2012), although use of lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga menziesii*) has been documented in other regions of the province (Davis 2009). Dens are generally found in trees which are large relative to the surrounding stand – in the Williston region (Weir and Corbould 2008), den trees averaged 109 cm diameter at breast height (dbh) (black cottonwood), while in the Peace Region (Weir *et al.* 2012), den trees averaged 50 cm dbh (aspen) and 58 cm dbh (balsam poplar). At the broader scale, Weir *et al.* (2012) found that fisher dens in the Peace Region were most likely to be located in sites with a high mean dbh of aspen or balsam poplar trees, high vertical diversity index (i.e. high percent cover of the various layers of woody plants – tree, high shrub, low shrub) and little to no hard CWD. Dens were also more likely to be found within the center of a female's non-denning home range than on the periphery, and were found in a variety of ecosystem types but predominantly in young or mature deciduous-dominated forests on mesic or moist sites. Specific cavity tree requirements for the most commonly used zones which are found within the RSA are shown in Table 16.

Habitat Suitability Ratings

Provincial benchmarks at the ecosection and the ecosystem level are not established for fisher. Weir (2003) proposes that, based on biogeoclimatic units, fisher harvests, and expert opinion, the provincial benchmark can be defined as the dry-warm subzone of the Sub-Boreal Spruce biogeoclimatic zone (SBSdw), which is located in the Caribou and Prince George Forest Regions of central B.C. However, work conducted since 2003 has indicated that the BWBSmw biogeoclimatic zone of the Kiskatinaw Plateau and Peace Lowlands ecosections in the Peace Region of northeast B.C. may support equal or even higher densities of fisher than the SBSdw (Lofroth 2004, R. Weir *pers. comm.*).

Since the level of knowledge concerning the habitat requirements of fisher in B.C. is well documented, the 6-class Habitat Suitability Rating Scheme was used: 1 (High), 2 (Moderately High), 3 (Moderate), 4 (Low), 5 (Very Low), 6 (Nil). Table 17 summarizes the ratings assumptions used to rate ecosystem units and structural stages for fisher habitat suitability in the two selected life requisite-seasons: living-all seasons and birthing/reproduction. Site series occurring in the RSA were assessed using regional field guides (e.g. DeLong *et al.* 1994).

In the RSA, the best habitat for fisher is expected to be found in the valley bottoms of the Murray River and Wolverine River valleys and their primary tributaries within the BWBS and SBS biogeoclimatic zones. Highest rated habitats for birthing were within the BWBSmw, BWBSwk1 and SBSwk2 biogeoclimatic zone variants within site series that are predominately coniferous but likely possess the occasional large aspen or cottonwood tree suitable for denning. These sites were mesic to wet site series in structural stages 5, 6, and 7. Additionally, potential resting habitats are expected to be most likely to occur in structural stages 5 to 7. Alpine, parkland, water and wetland and ESSF ecosystem units were mostly rated nil while remaining units of the BWBS and SBS were rated various levels of moderate to low. The living life requisite for fisher was rated similarly to birthing, but they reflect a wider range of habitats used. For example, more parkland, wetland and ESSF units were given non-nil (but low ratings) to demonstrate some use of these areas. Additionally, more site series within the BWBSmw, BWBSwk1 and SBSwk2 were rated moderate to high as they likely provide a productive understory, abundant CWD, and a diverse prey base for fisher living requirements.

Table 16. Key structural habitat requirements of fishers (adapted from Weir and Almuedo 2010).

Activity	BEC Zone	Habitat Characteristic
Resting, Security, Thermal Cover	SBS	• Rust brooms (≥40cm diameter) on hybrid spruce (≥40cm dbh) • Cavities (trunk rot) and large branches of aspen (populous tremuloides) (≥50cm dbh) • Black cottonwood with internal decay (≥75cm dbh) • CWD (≥35 cm diameter, decay class 2-3, ≥10cm long), elevated from ground
	BWBS	• White (≥30cm dbh) and black spruce (≥20cm dbh) with rust brooms • Aspen (≥40 cm dbh) and balsam poplar (≥45cm dbh) with internal decay • Slash/debris piles (> 20m3) • Abandoned woodchuck burrows (sub -20°C)
Denning	SBS	• Black cottonwood (≥90cm dbh)
	BWBS	• Trembling aspen (≥40cm dbh) • Balsam poplar (≥50cm dbh)

Table 17. Quantifiable ecosystem attributes for fisher (modified from Saxena and Bilyk 2000).

Season	Life Requisite	Ecosystem Attributes
All	LI	• Found in low- to mid-elevation forested habitat – BWBS, SBS and lower elevation ESSF will be the primary biogeoclimatic zones • Structural stages 5 to 7 preferred, although structural stages 3 and 4 may also be used; structural stages 5 to 7 assumed to provide abundant resting sites • Avoidance of structural stages 1 and 2. • Gentle to moderate slopes • Coniferous or mixed coniferous-deciduous forests • Canopy closure between 30-60% • Multistoried canopy with a diversity of species is preferred • Abundant CWD and productive shrub layer provide foraging opportunities and abundant prey • Riparian and edge habitat typically provide abundant prey sources
Spring	BI	• Require large-diameter deciduous trees with interior cavities – species include trembling aspen, black cottonwood and balsam poplar • Suitable denning trees are often found along valley bottoms and riparian areas – BWBS and SBS will be the primary biogeoclimatic zones • Large diameter trees are expected to be most prevalent within structural stages 5 to 7 • Feeding, security/thermal, and resting habitats will be the same as above – selection for closed canopy forest with a diverse understory, CWD, gentle to moderate slopes etc.

5 CONCLUSION & CONTINUOUS IMPROVEMENT

Wildlife Habitat Suitability Ratings for woodland caribou, Black-throated Green Warbler, mountain goat, moose, grizzly bear and fisher have been successfully developed for the Murray River Project. The ratings were part of larger Species-Habitat Models created specifically for the RSA, which included the species accounts, the ratings themselves in Wildlife Habitat Suitability Ratings tables and a series of Habitat Suitability maps for each species. These maps were produced using the most current Predictive Ecosystem Mapping (PEM) project (Rescan 2012) as the spatial base layer of detailed ecosystem units.

As a conclusion to this final report, suggestions are provided for future wildlife studies that would serve to continually improve the knowledge of wildlife within the RSA:

- Proximity effects on specific wildlife life requisites (e.g. grizzly bear spring habitat) could be evaluated using GIS. WHRs would then be adjusted in specific areas according to the presence of features that are not identified by the ecosystem unit. For example, ratings may be upgraded due to the proximity of favorable habitat features such as streams, rocky outcrops, cutblocks or slope/aspect. Other ratings may be downgraded due to the sensitivity of a species to resource roads or other linear features, oil and gas developments or existing mineral exploration or extraction activities. The value of this type of analysis was realized during the preparation of the interim report; however, time, resource and budget constraints did not allow for this expansion of scope.
- A more detailed TEM was also produced by Rescan for the LSA to provide more precise ecological information at the site level of the project. However, this work was not made available to EDI in time to incorporate into the WHRs. WHRs could be applied to the TEM for species with high value habitat within the LSA to aid in risk identification and mitigation planning for the Project.
- An analysis to determine the potential impacts of mountain pine beetle infestation on the wildlife habitat ratings at present and into the future could be performed. A qualitative analysis involving a primary literature search would likely produce a theoretical picture of expected changes to wildlife habitat ratings for a chosen time period. A more detailed quantitative analysis, one which involves changing WHRs to produce suitability maps current to the stage of infestation would be much more complex. The utility of this analysis would also be time-limited as the infestation progresses and causes continual change of the affected forest stands.

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6.2 SPATIAL DATA

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6.3 SPATIAL DATA DISCLAIMER

Maps presented in this document are a geographical representation of known features. Although the data collected and presented herein has been obtained with the utmost attention to quality, this document is not an official land survey and should not be considered for spatial calculation. EDI Environmental Dynamics Inc. does not accept any liability for errors, omissions or inaccuracies in the data.

APPENDIX A BIOGEOCLIMATIC ZONES WITHIN THE RSA

BEC Zone Variant	Location	Elevation Range (m)	Mean Annual Precipitation (mm)	Dominant Forest Composition	Site Series (and Broad-leaved Units where applicable)
SBSwk2	All major drainages in rocky mountains	750 – 1200	952	• longer periodicity of stand replacement events yields climax forests of hybrid white spruce and subalpine fir • lodgepole pine common on dry sites, black spruce occurs with lodgepole pine on gentle slopes with cool aspect and in wet sites • black cottonwood found along streams and rivers often in association with hybrid white spruce	• Hybrid white spruce - Oak fern • Lodgepole pine – Huckleberry – Cladina • Hybrid white spruce –Huckleberry – Highbush-cranberry • Black spruce – Lodgepole pine – Feathermoss • Hybrid white spruce – Devil's club • Hybrid white spruce – Horsetail
BWBSmw	Rolling topography	750 – 1050	515	• Generally white spruce or aspen • Balsam poplar common on low, wet sites • White spruce on moist to wet sites with limited fire disturbance • Lodgepole pine on drier and poorer sites • Black spruce (with minor Tamarack component) on organic soils	Site Series • White spruce – Trailing raspberry – Step moss • Lodgepole pine – Kinnikinnick – Lingonberry • White Spruce – Lodgepole pine – Soopolallie – Wildrye • Black spruce – Lingonberry – Step moss • White spruce – Oakfern – Sarsaparilla • White spruce – Currant – Horsetail • Balsam poplar – White Spruce – Mountain alder – Dogwood Broad-leaved Units • Trembling aspen – Rose – Creamy peavine • Trembling aspen – Soopolallie – Kinnikinnick • Trembling aspen – Rose – Fuzzy-spiked wildrye • Trembling aspen – Labrador tea – Lingonberry • Trembling aspen – Highbush-cranberry – Oak fern • Trembling aspen – Cow-parsnip – Meadowrue • Balsam poplar – White Spruce – Mountain alder – Dogwood

BEC Zone Variant	Location	Elevation Range (m)	Mean Annual Precipitation (mm)	Dominant Forest Composition	Site Series (and Broad-leaved Units where applicable)
BWBSwk1	Mid to lower slopes of Rocky Mountains	900 – 1200	743	• Mature forests dominated by white spruce with some black spruce on wetter and poorer sites • Lodgepole pine is the dominant seral species • Aspen is the dominant seral species at lower elevations	Site Series • White spruce –Subalpine fir - Huckleberry – Feathermoss • Lodgepole pine – Lingonberry – Reindeer lichen • White spruce – Lodgepole pine – Soopolallie – Showy aster • Black spruce – Huckleberry - Lingonberry • White spruce – Currant – Horsetail • Black spruce – Lingonberry – Horsetail Broad-leaved Units • Trembling aspen – Birch-leaved spiraea – Huckleberry • Trembling aspen – Kinnikinnick – Fuzzy-spiked wildrye • Trembling aspen – Rose – Fuzzy-spiked wildrye • Trembling aspen – Labrador tea – Lingonberry • Balsam poplar – Trembling aspen – Cow-parsnip • Trembling aspen – Highbush-cranberry – Oak fern
ESSFmv2	East of Rocky Mountain divide, above SBSwk2 or BWBSwk1	950 – 1550	780	• Climax dominated by Engelmann spruce and subalpine fir • More fire than most ESSF forests results in some stands dominated by lodgepole pine • Poor, lower elevation sites may have mixtures of lodgepole pine and black spruce	• Subalpine fir – Rhododendron – Feathermoss • Subalpine fir – Lingonberry • Subalpine fir – Black spruce – Labrador tea • Subalpine fire – Oakfern – Knight's plume • Subalpine fir – Devil's club – Rhododendron • Subalpine fir – Alder –Horsetail

BEC Zone Variant	Location	Elevation Range (m)	Mean Annual Precipitation (mm)	Dominant Forest Composition	Site Series (and Broad-leaved Units where applicable)
ESSFwc3	Rocky Mountains, above ESSFwk2	1300 – 1550	1408.5	• Subalpine fir and/or Engelmann spruce, widely spaced, clumpy	• Subalpine fir – Rhododendron – Oak fern • Subalpine fir – Rhododendron – Queen's cup • Subalpine fir – Globeflower – Horsetail
ESSFwk2	West of Rocky Mountain divide, south to Morkill river, north to Ospika arm, above SBS, below ESSFwc3	950 – 1300	1537.8	• Climax dominated by Engelmann spruce and subalpine fir • Little fire disturbance so few early seral stands though some lodgepole pine stands at southern end • Sitka alder (Alnus crispa) swales common on north-facing slopes	• Subalpine fir – Oak fern – Knight's plume • Subalpine fir – Oak fern – Sarsaparilla • Subalpine fir – Oak fern – Bluebells • Subalpine fir – Devil's club – Rhododendron • Subalpine fir – Rhododendron – Lady fern • Subalpine fir – Horsetail – Sphagnum • Non-forested Bog

- NOTE: there are no general descriptions for the parkland (i.e. ESSFmvp and ESSFwcp) or alpine (i.e. BAFA) units available at this time. Descriptions for new high elevation classifications are anticipated to be available in the near future.
- Adapted from DeLong *et al.* 1990, DeLong *et al.* 1994 and DeLong *et al.* 2011.

APPENDIX B PRELIMINARY WILDLIFE HABITAT RATINGS TABLES

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
1	AT	AT	/	/	/	AT		1	1	1	N	6	5	5	3	5	1	6	6
	AT	AT	/	/	31	AT/31	2	2	1	1	N	6	5	5	3	5	3	6	6
	AT	AT	/	/	31	AT/31	3	2	1	1	N	6	5	5	3	5	3	6	6
	AT	AT	/	/	31	AT/31	4	2	1	1	N	6	5	5	3	5	3	6	6
	AT	AT	/	/	31	AT/31	5	2	1	1	N	6	5	5	3	5	3	6	6
	AT	AT	/	/	31	AT/31	6	2	1	1	N	6	5	5	3	5	3	6	6
	AT	AT	/	/	31	AT/31	7	2	1	1	N	6	5	5	3	5	3	6	6
1	AT	AT	/	/	31	AT/31		2	1	1	N	6	5	5	3	5	3	6	6
	AT	AT	/	/	32	AT/32	2	2	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	32	AT/32	3	2	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	32	AT/32	4	2	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	32	AT/32	5	2	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	32	AT/32	6	2	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	32	AT/32	7	2	2	2	N	6	5	4	3	5	1	6	6
1	AT	AT	/	/	32	AT/32		2	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	33	AT/33	2	1	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	33	AT/33	3	1	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	33	AT/33	4	1	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	33	AT/33	5	1	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	33	AT/33	6	1	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	33	AT/33	7	1	2	2	N	6	5	4	3	5	1	6	6
1	AT	AT	/	/	33	AT/33		1	2	2	N	6	5	4	3	5	1	6	6
	AT	AT	/	/	34	AT/34	2	1	1	3	N	6	5	5	3	5	5	6	6
	AT	AT	/	/	34	AT/34	3	1	1	3	N	6	5	5	3	5	5	6	6
	AT	AT	/	/	34	AT/34	4	1	1	3	N	6	5	5	3	5	5	6	6
	AT	AT	/	/	34	AT/34	5	1	1	3	N	6	5	5	3	5	5	6	6
	AT	AT	/	/	34	AT/34	6	1	1	3	N	6	5	5	3	5	5	6	6
	AT	AT	/	/	34	AT/34	7	1	1	3	N	6	5	5	3	5	5	6	6
1	AT	AT	/	/	34	AT/34		1	1	3	N	6	5	5	3	5	5	6	6
1	AT	AT	/	/	BI	AT/BI	2	6	6	6	N	6	6	6	6	6	6	6	6
1	AT	AT	/	/	ES	AT/ES	2	6	6	6	N	6	6	6	6	6	6	6	6
1	AT	AT	/	/	LA	AT/LA	2	6	6	6	N	6	5	6	6	6	6	6	6
1	AT	AT	/	/	RO	AT/RO	2	6	6	6	N	6	6	6	6	6	4	6	6
	BWBSmw1	BWBS	mw	1	01$	BWBSmw1/01$	2	5	5	6	N	1	1	3	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	01$	BWBSmw1/01$	3	5	5	6	N	1	1	3	4	4	6	5	6
	BWBSmw1	BWBS	mw	1	01$	BWBSmw1/01$	4	5	5	6	N	1	1	4	4	4	6	5	6
	BWBSmw1	BWBS	mw	1	01$	BWBSmw1/01$	5	5	5	6	M	1	1	4	4	4	6	3	4
	BWBSmw1	BWBS	mw	1	01$	BWBSmw1/01$	6	5	5	6	H	1	1	4	4	4	6	2	3
	BWBSmw1	BWBS	mw	1	01$	BWBSmw1/01$	7	5	5	6	H	1	1	4	4	4	6	1	3
1	BWBSmw1	BWBS	mw	1	01$	BWBSmw1/01$		5	5	6	H	1	1	3	4	4	6	1	3
	BWBSmw1	BWBS	mw	1	02$	BWBSmw1/02$	2	5	5	6	N	1	1	2	5	6	6	5	6
	BWBSmw1	BWBS	mw	1	02$	BWBSmw1/02$	3	5	5	6	N	1	1	2	5	3	6	5	6
	BWBSmw1	BWBS	mw	1	02$	BWBSmw1/02$	4	5	5	6	N	1	1	4	5	3	6	5	6
	BWBSmw1	BWBS	mw	1	02$	BWBSmw1/02$	5	5	5	6	N	1	1	4	5	3	6	4	6
	BWBSmw1	BWBS	mw	1	02$	BWBSmw1/02$	6	5	5	6	N	1	1	4	5	3	6	3	6
	BWBSmw1	BWBS	mw	1	02$	BWBSmw1/02$	7	5	5	6	N	1	1	4	5	3	6	2	6
1	BWBSmw1	BWBS	mw	1	02$	BWBSmw1/02$		5	5	6	N	1	1	2	5	3	6	2	6
	BWBSmw1	BWBS	mw	1	04$	BWBSmw1/04$	2	5	5	6	N	2	2	5	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	04$	BWBSmw1/04$	3	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	04$	BWBSmw1/04$	4	5	5	6	N	2	2	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	04$	BWBSmw1/04$	5	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	04$	BWBSmw1/04$	6	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	04$	BWBSmw1/04$	7	5	5	6	N	1	1	5	4	3	6	5	6
1	BWBSmw1	BWBS	mw	1	04$	BWBSmw1/04$		5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	05	BWBSmw1/05	2	5	5	6	N	1	1	5	3	6	6	5	6
	BWBSmw1	BWBS	mw	1	05	BWBSmw1/05	3	5	5	6	N	1	1	5	3	2	6	5	6
	BWBSmw1	BWBS	mw	1	05	BWBSmw1/05	4	5	5	6	N	1	1	5	3	2	6	5	6
	BWBSmw1	BWBS	mw	1	05	BWBSmw1/05	5	5	5	6	M	2	2	5	3	2	5	3	4
	BWBSmw1	BWBS	mw	1	05	BWBSmw1/05	6	5	5	6	M	2	2	5	3	2	5	2	3
	BWBSmw1	BWBS	mw	1	05	BWBSmw1/05	7	5	5	6	M	2	2	5	3	2	5	1	3
1	BWBSmw1	BWBS	mw	1	05	BWBSmw1/05		5	5	6	M	1	1	5	3	2	5	1	3
	BWBSmw1	BWBS	mw	1	05$	BWBSmw1/05$	2	5	5	6	N	1	1	5	3	6	6	5	6
	BWBSmw1	BWBS	mw	1	05$	BWBSmw1/05$	3	5	5	6	N	1	1	5	3	2	6	5	6
	BWBSmw1	BWBS	mw	1	05$	BWBSmw1/05$	4	5	5	6	N	1	1	5	3	2	6	5	6
	BWBSmw1	BWBS	mw	1	05$	BWBSmw1/05$	5	5	5	6	M	1	1	5	3	2	6	3	4
	BWBSmw1	BWBS	mw	1	05$	BWBSmw1/05$	6	5	5	6	M	1	1	5	3	2	6	2	3

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	BWBSmw1	BWBS	mw	1	05$	BWBSmw1/05$	7	5	5	6	M	1	1	5	3	2	6	1	3
1	BWBSmw1	BWBS	mw	1	05$	BWBSmw1/05$		5	5	6	M	1	1	5	3	2	6	1	3
	BWBSmw1	BWBS	mw	1	06$	BWBSmw1/06$	2	5	5	6	N	1	1	2	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	06$	BWBSmw1/06$	3	5	5	6	N	1	1	2	4	2	6	5	6
	BWBSmw1	BWBS	mw	1	06$	BWBSmw1/06$	4	5	5	6	N	1	1	4	4	2	6	5	6
	BWBSmw1	BWBS	mw	1	06$	BWBSmw1/06$	5	5	5	6	M	1	1	4	4	2	6	3	4
	BWBSmw1	BWBS	mw	1	06$	BWBSmw1/06$	6	5	5	6	M	1	1	4	4	2	6	2	3
	BWBSmw1	BWBS	mw	1	06$	BWBSmw1/06$	7	5	5	6	M	1	1	4	4	2	6	1	3
1	BWBSmw1	BWBS	mw	1	06$	BWBSmw1/06$		5	5	6	M	1	1	2	4	2	6	1	3
	BWBSmw1	BWBS	mw	1	07$	BWBSmw1/07$	2	5	5	6	N	1	1	3	5	6	6	5	6
	BWBSmw1	BWBS	mw	1	07$	BWBSmw1/07$	3	5	5	6	N	1	1	3	5	2	6	5	6
	BWBSmw1	BWBS	mw	1	07$	BWBSmw1/07$	4	5	5	6	N	1	1	4	5	2	6	5	6
	BWBSmw1	BWBS	mw	1	07$	BWBSmw1/07$	5	5	5	6	M	1	1	4	5	2	6	3	4
	BWBSmw1	BWBS	mw	1	07$	BWBSmw1/07$	6	5	5	6	M	1	1	4	5	2	6	2	3
	BWBSmw1	BWBS	mw	1	07$	BWBSmw1/07$	7	5	5	6	M	1	1	4	5	2	6	1	3
1	BWBSmw1	BWBS	mw	1	07$	BWBSmw1/07$		5	5	6	M	1	1	3	5	2	6	1	3
	BWBSmw1	BWBS	mw	1	31	BWBSmw1/31	2	5	5	6	N	1	1	3	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	31	BWBSmw1/31	3	5	5	6	N	1	1	3	4	4	6	5	6
	BWBSmw1	BWBS	mw	1	31	BWBSmw1/31	4	5	5	6	N	1	1	4	4	4	6	5	6
	BWBSmw1	BWBS	mw	1	31	BWBSmw1/31	5	5	5	6	N	2	2	4	4	4	5	4	6
	BWBSmw1	BWBS	mw	1	31	BWBSmw1/31	6	5	5	6	N	2	2	4	4	4	5	3	6
	BWBSmw1	BWBS	mw	1	31	BWBSmw1/31	7	5	5	6	N	2	2	4	4	4	5	2	6
1	BWBSmw1	BWBS	mw	1	31	BWBSmw1/31		5	5	6	N	1	1	3	4	4	5	2	6
	BWBSmw1	BWBS	mw	1	32	BWBSmw1/32	2	5	5	6	N	1	1	2	5	6	6	5	6
	BWBSmw1	BWBS	mw	1	32	BWBSmw1/32	3	5	5	6	N	1	1	2	5	4	6	5	6
	BWBSmw1	BWBS	mw	1	32	BWBSmw1/32	4	5	5	6	N	1	1	4	5	4	6	5	6
	BWBSmw1	BWBS	mw	1	32	BWBSmw1/32	5	5	5	6	L	1	1	4	5	4	5	4	4
	BWBSmw1	BWBS	mw	1	32	BWBSmw1/32	6	5	5	6	L	1	1	4	5	4	5	3	3
	BWBSmw1	BWBS	mw	1	32	BWBSmw1/32	7	5	5	6	L	1	1	4	5	4	5	2	2
1	BWBSmw1	BWBS	mw	1	32	BWBSmw1/32		5	5	6	L	1	1	2	5	4	5	2	2
	BWBSmw1	BWBS	mw	1	33	BWBSmw1/33	2	5	5	6	N	3	1	3	3	6	6	5	6
	BWBSmw1	BWBS	mw	1	33	BWBSmw1/33	3	5	5	6	N	1	1	3	3	4	6	5	6
	BWBSmw1	BWBS	mw	1	33	BWBSmw1/33	4	5	5	6	N	1	1	4	3	4	6	5	6
	BWBSmw1	BWBS	mw	1	33	BWBSmw1/33	5	5	5	6	N	1	1	4	3	4	6	5	6
	BWBSmw1	BWBS	mw	1	33	BWBSmw1/33	6	5	5	6	N	1	1	4	3	4	6	5	6
	BWBSmw1	BWBS	mw	1	33	BWBSmw1/33	7	5	5	6	N	1	1	4	3	4	6	5	6
1	BWBSmw1	BWBS	mw	1	33	BWBSmw1/33		5	5	6	N	1	1	3	3	4	6	5	6
	BWBSmw1	BWBS	mw	1	34	BWBSmw1/34	2	5	5	6	N	1	3	5	5	6	6	5	6
	BWBSmw1	BWBS	mw	1	34	BWBSmw1/34	3	5	5	6	N	1	1	5	5	4	6	5	6
	BWBSmw1	BWBS	mw	1	34	BWBSmw1/34	4	5	5	6	N	1	1	5	5	4	6	5	6
	BWBSmw1	BWBS	mw	1	34	BWBSmw1/34	5	5	5	6	N	1	1	5	5	4	6	5	6
	BWBSmw1	BWBS	mw	1	34	BWBSmw1/34	6	5	5	6	N	1	1	5	5	4	6	5	6
	BWBSmw1	BWBS	mw	1	34	BWBSmw1/34	7	5	5	6	N	1	1	5	5	4	6	5	6
1	BWBSmw1	BWBS	mw	1	34	BWBSmw1/34		5	5	6	N	1	1	5	5	4	6	5	6
1	BWBSmw1	BWBS	mw	1	ES	BWBSmw1/ES	2	5	5	6	N	6	6	6	6	6	6	5	6
1	BWBSmw1	BWBS	mw	1	GB	BWBSmw1/GB	2	5	5	6	N	6	4	6	6	6	6	5	6
1	BWBSmw1	BWBS	mw	1	LA	BWBSmw1/LA	2	6	6	6	N	4	4	6	6	6	6	6	6
1	BWBSmw1	BWBS	mw	1	RI	BWBSmw1/RI	2	6	6	6	N	6	5	6	6	6	6	6	6
	BWBSwk1	BWBS	wk	1	01	BWBSwk1/01	2	5	5	6	N	4	3	3	4	6	6	5	6
	BWBSwk1	BWBS	wk	1	01	BWBSwk1/01	3	5	5	6	N	3	1	3	4	4	6	5	6
	BWBSwk1	BWBS	wk	1	01	BWBSwk1/01	4	5	5	6	N	3	1	4	4	4	6	5	6
	BWBSwk1	BWBS	wk	1	01	BWBSwk1/01	5	5	5	6	L	3	2	4	4	4	5	3	5
	BWBSwk1	BWBS	wk	1	01	BWBSwk1/01	6	5	5	6	L	3	2	4	4	4	5	3	5
	BWBSwk1	BWBS	wk	1	01	BWBSwk1/01	7	5	5	6	L	3	2	4	4	4	5	3	5
1	BWBSwk1	BWBS	wk	1	01	BWBSwk1/01		5	5	6	L	3	1	3	4	4	5	3	5
	BWBSwk1	BWBS	wk	1	02	BWBSwk1/02	2	5	5	6	N	4	3	5	5	6	6	5	6
	BWBSwk1	BWBS	wk	1	02	BWBSwk1/02	3	5	5	6	N	3	1	5	5	4	6	5	6
	BWBSwk1	BWBS	wk	1	02	BWBSwk1/02	4	5	5	6	N	3	1	5	5	4	6	5	6
	BWBSwk1	BWBS	wk	1	02	BWBSwk1/02	5	5	5	6	N	3	2	5	5	4	5	5	6
	BWBSwk1	BWBS	wk	1	02	BWBSwk1/02	6	5	5	6	N	3	2	5	5	4	5	5	6
	BWBSwk1	BWBS	wk	1	02	BWBSwk1/02	7	5	5	6	N	3	2	5	5	4	5	5	6
1	BWBSwk1	BWBS	wk	1	02	BWBSwk1/02		5	5	6	N	3	1	5	5	4	5	5	6
	BWBSwk1	BWBS	wk	1	04	BWBSwk1/04	2	5	5	6	N	4	3	2	3	6	6	5	6
	BWBSwk1	BWBS	wk	1	04	BWBSwk1/04	3	5	5	6	N	3	1	2	3	4	6	5	6
	BWBSwk1	BWBS	wk	1	04	BWBSwk1/04	4	5	5	6	N	3	1	4	3	4	6	5	6
	BWBSwk1	BWBS	wk	1	04	BWBSwk1/04	5	5	5	6	N	3	2	4	3	4	5	4	6
	BWBSwk1	BWBS	wk	1	04	BWBSwk1/04	6	5	5	6	N	3	2	4	3	4	5	4	6

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	BWBSwk1	BWBS	wk	1	04	BWBSwk1/04	7	5	5	6	N	3	2	4	3	4	5	4	6
1	BWBSwk1	BWBS	wk	1	04	BWBSwk1/04		5	5	6	N	3	1	2	3	4	5	4	6
	BWBSwk1	BWBS	wk	1	07	BWBSwk1/07	2	5	5	6	N	4	3	2	3	6	6	5	6
	BWBSwk1	BWBS	wk	1	07	BWBSwk1/07	3	5	5	6	N	3	1	2	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	07	BWBSwk1/07	4	5	5	6	N	3	1	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	07	BWBSwk1/07	5	5	5	6	N	3	2	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	07	BWBSwk1/07	6	5	5	6	N	3	2	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	07	BWBSwk1/07	7	5	5	6	N	3	2	4	3	5	6	5	6
1	BWBSwk1	BWBS	wk	1	07	BWBSwk1/07		5	5	6	N	3	1	2	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	08	BWBSwk1/08	2	5	5	6	N	4	3	2	3	6	6	5	6
	BWBSwk1	BWBS	wk	1	08	BWBSwk1/08	3	5	5	6	N	3	1	2	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	08	BWBSwk1/08	4	5	5	6	N	3	1	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	08	BWBSwk1/08	5	5	5	6	N	3	2	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	08	BWBSwk1/08	6	5	5	6	N	3	2	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	08	BWBSwk1/08	7	5	5	6	N	3	2	4	3	5	6	5	6
1	BWBSwk1	BWBS	wk	1	08	BWBSwk1/08		5	5	6	N	3	1	2	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	31	BWBSwk1/31	2	5	5	6	N	4	3	3	4	6	6	5	6
	BWBSwk1	BWBS	wk	1	31	BWBSwk1/31	3	5	5	6	N	3	1	3	4	4	6	5	6
	BWBSwk1	BWBS	wk	1	31	BWBSwk1/31	4	5	5	6	N	3	1	4	4	4	6	5	6
	BWBSwk1	BWBS	wk	1	31	BWBSwk1/31	5	5	5	6	N	3	2	4	4	4	6	4	6
	BWBSwk1	BWBS	wk	1	31	BWBSwk1/31	6	5	5	6	N	3	2	4	4	4	6	4	6
	BWBSwk1	BWBS	wk	1	31	BWBSwk1/31	7	5	5	6	N	3	2	4	4	4	6	4	6
1	BWBSwk1	BWBS	wk	1	31	BWBSwk1/31		5	5	6	N	3	1	3	4	4	6	4	6
	BWBSwk1	BWBS	wk	1	32	BWBSwk1/32	2	5	5	6	N	4	3	3	4	6	6	5	6
	BWBSwk1	BWBS	wk	1	32	BWBSwk1/32	3	5	5	6	N	3	1	3	4	4	6	5	6
	BWBSwk1	BWBS	wk	1	32	BWBSwk1/32	4	5	5	6	N	3	1	4	4	4	6	4	6
	BWBSwk1	BWBS	wk	1	32	BWBSwk1/32	5	5	5	6	L	3	2	4	4	4	6	3	3
	BWBSwk1	BWBS	wk	1	32	BWBSwk1/32	6	5	5	6	L	3	2	4	4	4	6	2	2
	BWBSwk1	BWBS	wk	1	32	BWBSwk1/32	7	5	5	6	L	3	2	4	4	4	6	2	2
1	BWBSwk1	BWBS	wk	1	32	BWBSwk1/32		5	5	6	L	3	1	3	4	4	6	2	2
	BWBSwk1	BWBS	wk	1	33	BWBSwk1/33	2	5	5	6	N	4	3	3	3	6	6	5	6
	BWBSwk1	BWBS	wk	1	33	BWBSwk1/33	3	5	5	6	N	3	1	3	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	33	BWBSwk1/33	4	5	5	6	N	3	1	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	33	BWBSwk1/33	5	5	5	6	N	3	2	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	33	BWBSwk1/33	6	5	5	6	N	3	2	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	33	BWBSwk1/33	7	5	5	6	N	3	2	4	3	5	6	5	6
1	BWBSwk1	BWBS	wk	1	33	BWBSwk1/33		5	5	6	N	3	1	3	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	34	BWBSwk1/34	2	5	5	6	N	4	3	3	3	6	6	5	6
	BWBSwk1	BWBS	wk	1	34	BWBSwk1/34	3	5	5	6	N	3	1	3	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	34	BWBSwk1/34	4	5	5	6	N	3	1	4	3	5	6	5	6
	BWBSwk1	BWBS	wk	1	34	BWBSwk1/34	5	5	5	6	N	3	2	4	3	5	6	4	6
	BWBSwk1	BWBS	wk	1	34	BWBSwk1/34	6	5	5	6	N	3	2	4	3	5	6	4	6
	BWBSwk1	BWBS	wk	1	34	BWBSwk1/34	7	5	5	6	N	3	2	4	3	5	6	4	6
1	BWBSwk1	BWBS	wk	1	34	BWBSwk1/34		5	5	6	N	3	1	3	3	5	6	4	6
1	BWBSwk1	BWBS	wk	1	LA	BWBSwk1/LA	2	6	6	6	N	4	4	6	6	6	6	6	6
1	BWBSwk1	BWBS	wk	1	RI	BWBSwk1/RI	2	6	6	6	N	6	5	6	6	6	6	6	6
1	BWBSwk1	BWBS	wk	1	UR	BWBSwk1/UR	2	6	6	6	L	5	5	6	6	6	6	6	6
	ESSFmv2	ESSF	mv	2	03	ESSFmv2/03	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	03	ESSFmv2/03	3	4	5	6	N	5	3	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	03	ESSFmv2/03	4	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	03	ESSFmv2/03	5	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	03	ESSFmv2/03	6	4	5	6	N	5	3	4	3	2	5	5	6
	ESSFmv2	ESSF	mv	2	03	ESSFmv2/03	7	4	5	6	N	5	3	4	3	2	5	5	6
1	ESSFmv2	ESSF	mv	2	03	ESSFmv2/03		4	5	6	N	5	3	4	3	2	5	5	6
	ESSFmv2	ESSF	mv	2	05	ESSFmv2/05	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	05	ESSFmv2/05	3	4	5	6	N	5	3	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	05	ESSFmv2/05	4	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	05	ESSFmv2/05	5	4	5	6	N	5	3	4	3	2	6	4	6
	ESSFmv2	ESSF	mv	2	05	ESSFmv2/05	6	4	5	6	N	5	3	4	3	2	5	4	6
	ESSFmv2	ESSF	mv	2	05	ESSFmv2/05	7	4	5	6	N	5	3	4	3	2	5	3	6
1	ESSFmv2	ESSF	mv	2	05	ESSFmv2/05		4	5	6	N	5	3	4	3	2	5	3	6
	ESSFmv2	ESSF	mv	2	31	ESSFmv2/31	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	31	ESSFmv2/31	3	4	5	6	N	5	5	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	31	ESSFmv2/31	4	4	5	6	N	5	5	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	31	ESSFmv2/31	5	4	5	6	N	5	5	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	31	ESSFmv2/31	6	4	5	6	N	5	5	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	31	ESSFmv2/31	7	4	5	6	N	5	5	4	3	2	6	5	6

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
1	ESSFmv2	ESSF	mv	2	31	ESSFmv2/31		4	5	6	N	5	5	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	32	ESSFmv2/32	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	32	ESSFmv2/32	3	4	5	6	N	5	4	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	32	ESSFmv2/32	4	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	32	ESSFmv2/32	5	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	32	ESSFmv2/32	6	4	5	6	N	5	4	4	3	2	6	4	6
	ESSFmv2	ESSF	mv	2	32	ESSFmv2/32	7	4	5	6	N	5	4	4	3	2	6	4	6
1	ESSFmv2	ESSF	mv	2	32	ESSFmv2/32		4	5	6	N	5	4	4	3	2	6	4	6
	ESSFmv2	ESSF	mv	2	33	ESSFmv2/33	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	33	ESSFmv2/33	3	4	5	6	N	5	4	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	33	ESSFmv2/33	4	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	33	ESSFmv2/33	5	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	33	ESSFmv2/33	6	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	33	ESSFmv2/33	7	4	5	6	N	5	4	4	3	2	6	5	6
1	ESSFmv2	ESSF	mv	2	33	ESSFmv2/33		4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	34	ESSFmv2/34	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	34	ESSFmv2/34	3	4	5	6	N	5	4	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	34	ESSFmv2/34	4	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	34	ESSFmv2/34	5	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	34	ESSFmv2/34	6	4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	34	ESSFmv2/34	7	4	5	6	N	5	4	4	3	2	6	5	6
1	ESSFmv2	ESSF	mv	2	34	ESSFmv2/34		4	5	6	N	5	4	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	35	ESSFmv2/35	2	4	5	6	N	6	5	6	6	6	6	6	6
	ESSFmv2	ESSF	mv	2	35	ESSFmv2/35	3	4	5	6	N	6	5	6	6	6	6	5	6
	ESSFmv2	ESSF	mv	2	35	ESSFmv2/35	4	4	5	6	N	6	5	6	6	6	6	5	6
	ESSFmv2	ESSF	mv	2	35	ESSFmv2/35	5	4	5	6	N	6	5	6	6	6	6	5	6
	ESSFmv2	ESSF	mv	2	35	ESSFmv2/35	6	4	5	6	N	6	5	6	6	6	5	5	6
	ESSFmv2	ESSF	mv	2	35	ESSFmv2/35	7	4	5	6	N	6	5	6	6	6	5	5	6
1	ESSFmv2	ESSF	mv	2	35	ESSFmv2/35		4	5	6	N	6	5	6	6	6	5	5	6
1	ESSFmv2	ESSF	mv	2	ES	ESSFmv2/ES	2	4	5	6	N	6	6	6	6	6	6	6	6
1	ESSFmv2	ESSF	mv	2	LA	ESSFmv2/LA	2	6	6	6	N	6	4	6	6	6	6	6	6
1	ESSFmv2	ESSF	mv	2	MZ	ESSFmv2/MZ	2	4	5	6	N	6	6	6	6	6	6	6	6
1	ESSFmv2	ESSF	mv	2	RE	ESSFmv2/RE	2	6	6	6	N	6	4	6	6	6	6	6	6
1	ESSFmv2	ESSF	mv	2	RI	ESSFmv2/RI	2	6	6	6	N	6	6	6	6	6	6	6	6
1	ESSFmv2	ESSF	mv	2	TZ	ESSFmv2/TZ	2	4	5	6	N	6	6	6	6	6	6	6	6
1	ESSFmv2	ESSF	mv	2	UR	ESSFmv2/UR	2	6	6	6	L	5	5	6	6	6	6	6	6
	ESSFmvp2	ESSF	mvp	2	31	ESSFmvp2/31	2	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFmvp2	ESSF	mvp	2	31	ESSFmvp2/31	3	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFmvp2	ESSF	mvp	2	31	ESSFmvp2/31	4	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFmvp2	ESSF	mvp	2	31	ESSFmvp2/31	5	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFmvp2	ESSF	mvp	2	31	ESSFmvp2/31	6	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFmvp2	ESSF	mvp	2	31	ESSFmvp2/31	7	4	5	6	N	5	3	3	3	5	2	5	6
1	ESSFmvp2	ESSF	mvp	2	31	ESSFmvp2/31		4	5	6	N	5	3	3	3	5	2	5	6
	ESSFmvp2	ESSF	mvp	2	32	ESSFmvp2/32	2	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	32	ESSFmvp2/32	3	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	32	ESSFmvp2/32	4	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	32	ESSFmvp2/32	5	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	32	ESSFmvp2/32	6	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	32	ESSFmvp2/32	7	4	5	6	N	6	5	5	5	5	1	5	6
1	ESSFmvp2	ESSF	mvp	2	32	ESSFmvp2/32		4	5	6	N	6	5	5	5	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	33	ESSFmvp2/33	2	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	33	ESSFmvp2/33	3	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	33	ESSFmvp2/33	4	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	33	ESSFmvp2/33	5	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	33	ESSFmvp2/33	6	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	33	ESSFmvp2/33	7	4	5	6	N	5	3	5	4	5	1	5	6
1	ESSFmvp2	ESSF	mvp	2	33	ESSFmvp2/33		4	5	6	N	5	3	5	4	5	1	5	6
	ESSFmvp2	ESSF	mvp	2	34	ESSFmvp2/34	2	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFmvp2	ESSF	mvp	2	34	ESSFmvp2/34	3	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFmvp2	ESSF	mvp	2	34	ESSFmvp2/34	4	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFmvp2	ESSF	mvp	2	34	ESSFmvp2/34	5	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFmvp2	ESSF	mvp	2	34	ESSFmvp2/34	6	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFmvp2	ESSF	mvp	2	34	ESSFmvp2/34	7	4	5	6	N	5	3	5	2	5	5	5	6
1	ESSFmvp2	ESSF	mvp	2	34	ESSFmvp2/34		4	5	6	N	5	3	5	2	5	5	5	6
1	ESSFmvp2	ESSF	mvp	2	ES	ESSFmvp2/ES	2	4	5	6	N	6	6	6	6	6	6	5	6
1	ESSFmvp2	ESSF	mvp	2	LA	ESSFmvp2/LA	2	6	6	6	N	6	4	6	6	6	6	5	6
1	ESSFmvp2	ESSF	mvp	2	RO	ESSFmvp2/RO	2	4	5	6	N	6	6	6	6	6	3	5	6

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
1	ESSFmvp2	ESSF	mvp	2	TZ	ESSFmvp2/TZ	2	4	5	6	N	6	6	6	6	6	6	5	6
1	ESSFmvp2	ESSF	mvp	2	UR	ESSFmvp2/UR	2	6	6	6	N	5	5	6	6	6	6	5	6
	ESSFwc3	ESSF	wc	3	01	ESSFwc3/01	2	4	5	6	N	6	5	4	3	3	5	6	6
	ESSFwc3	ESSF	wc	3	01	ESSFwc3/01	3	4	5	6	N	5	4	4	3	3	5	5	6
	ESSFwc3	ESSF	wc	3	01	ESSFwc3/01	4	4	5	6	N	5	4	4	3	3	5	5	6
	ESSFwc3	ESSF	wc	3	01	ESSFwc3/01	5	4	5	6	N	5	4	4	3	3	5	4	6
	ESSFwc3	ESSF	wc	3	01	ESSFwc3/01	6	4	5	6	N	5	4	4	3	3	5	4	6
	ESSFwc3	ESSF	wc	3	01	ESSFwc3/01	7	4	5	6	N	5	4	4	3	3	5	4	6
1	ESSFwc3	ESSF	wc	3	01	ESSFwc3/01		4	5	6	N	5	4	4	3	3	5	4	6
	ESSFwc3	ESSF	wc	3	02	ESSFwc3/02	2	4	5	6	N	6	5	4	3	4	5	6	6
	ESSFwc3	ESSF	wc	3	02	ESSFwc3/02	3	4	5	6	N	5	4	4	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	02	ESSFwc3/02	4	4	5	6	N	5	4	4	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	02	ESSFwc3/02	5	4	5	6	N	5	4	4	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	02	ESSFwc3/02	6	4	5	6	N	5	4	4	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	02	ESSFwc3/02	7	4	5	6	N	5	4	4	3	4	5	5	6
1	ESSFwc3	ESSF	wc	3	02	ESSFwc3/02		4	5	6	N	5	4	4	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	03	ESSFwc3/03	2	4	5	6	N	6	5	4	3	3	5	6	6
	ESSFwc3	ESSF	wc	3	03	ESSFwc3/03	3	4	5	6	N	5	4	4	3	3	5	5	6
	ESSFwc3	ESSF	wc	3	03	ESSFwc3/03	4	4	5	6	N	5	4	4	3	3	5	5	6
	ESSFwc3	ESSF	wc	3	03	ESSFwc3/03	5	4	5	6	N	5	4	4	3	3	5	5	6
	ESSFwc3	ESSF	wc	3	03	ESSFwc3/03	6	4	5	6	N	5	4	4	3	3	5	5	6
	ESSFwc3	ESSF	wc	3	03	ESSFwc3/03	7	4	5	6	N	5	4	4	3	3	5	5	6
1	ESSFwc3	ESSF	wc	3	03	ESSFwc3/03		4	5	6	N	5	4	4	3	3	5	5	6
	ESSFwc3	ESSF	wc	3	31	ESSFwc3/31	2	4	5	6	N	6	5	5	3	5	5	6	6
	ESSFwc3	ESSF	wc	3	31	ESSFwc3/31	3	4	5	6	N	5	5	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	31	ESSFwc3/31	4	4	5	6	N	5	5	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	31	ESSFwc3/31	5	4	5	6	N	5	5	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	31	ESSFwc3/31	6	4	5	6	N	5	5	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	31	ESSFwc3/31	7	4	5	6	N	5	5	5	3	5	5	5	6
1	ESSFwc3	ESSF	wc	3	31	ESSFwc3/31		4	5	6	N	5	5	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	32	ESSFwc3/32	2	4	5	6	N	6	5	5	3	4	5	6	6
	ESSFwc3	ESSF	wc	3	32	ESSFwc3/32	3	4	5	6	N	5	4	5	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	32	ESSFwc3/32	4	4	5	6	N	5	4	5	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	32	ESSFwc3/32	5	4	5	6	N	5	4	5	3	4	5	5	6
	ESSFwc3	ESSF	wc	3	32	ESSFwc3/32	6	4	5	6	N	5	4	5	3	4	5	4	6
	ESSFwc3	ESSF	wc	3	32	ESSFwc3/32	7	4	5	6	N	5	4	5	3	4	5	4	6
1	ESSFwc3	ESSF	wc	3	32	ESSFwc3/32		4	5	6	N	5	4	5	3	4	5	4	6
	ESSFwc3	ESSF	wc	3	33	ESSFwc3/33	2	4	5	6	N	6	5	5	3	5	5	6	6
	ESSFwc3	ESSF	wc	3	33	ESSFwc3/33	3	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	33	ESSFwc3/33	4	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	33	ESSFwc3/33	5	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	33	ESSFwc3/33	6	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	33	ESSFwc3/33	7	4	5	6	N	5	4	5	3	5	5	5	6
1	ESSFwc3	ESSF	wc	3	33	ESSFwc3/33		4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	34	ESSFwc3/34	2	4	5	6	N	6	5	5	3	5	5	6	6
	ESSFwc3	ESSF	wc	3	34	ESSFwc3/34	3	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	34	ESSFwc3/34	4	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	34	ESSFwc3/34	5	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	34	ESSFwc3/34	6	4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	34	ESSFwc3/34	7	4	5	6	N	5	4	5	3	5	5	5	6
1	ESSFwc3	ESSF	wc	3	34	ESSFwc3/34		4	5	6	N	5	4	5	3	5	5	5	6
	ESSFwc3	ESSF	wc	3	35	ESSFwc3/35	2	4	5	6	N	6	5	5	5	5	5	6	6
	ESSFwc3	ESSF	wc	3	35	ESSFwc3/35	3	4	5	6	N	6	5	5	5	5	5	5	6
	ESSFwc3	ESSF	wc	3	35	ESSFwc3/35	4	4	5	6	N	6	5	5	5	5	5	5	6
	ESSFwc3	ESSF	wc	3	35	ESSFwc3/35	5	4	5	6	N	6	5	5	5	5	5	5	6
	ESSFwc3	ESSF	wc	3	35	ESSFwc3/35	6	4	5	6	N	6	5	5	5	5	5	5	6
	ESSFwc3	ESSF	wc	3	35	ESSFwc3/35	7	4	5	6	N	6	5	5	5	5	5	5	6
1	ESSFwc3	ESSF	wc	3	35	ESSFwc3/35		4	5	6	N	6	5	5	5	5	5	5	6
1	ESSFwc3	ESSF	wc	3	LA	ESSFwc3/LA	2	6	6	6	N	6	5	6	6	6	6	6	6
	ESSFwcp3	ESSF	wcp	3	31	ESSFwcp3/31	2	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFwcp3	ESSF	wcp	3	31	ESSFwcp3/31	3	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFwcp3	ESSF	wcp	3	31	ESSFwcp3/31	4	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFwcp3	ESSF	wcp	3	31	ESSFwcp3/31	5	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFwcp3	ESSF	wcp	3	31	ESSFwcp3/31	6	4	5	6	N	5	3	3	3	5	2	5	6
	ESSFwcp3	ESSF	wcp	3	31	ESSFwcp3/31	7	4	5	6	N	5	3	3	3	5	2	5	6
1	ESSFwcp3	ESSF	wcp	3	31	ESSFwcp3/31		4	5	6	N	5	3	3	3	5	2	5	6
	ESSFwcp3	ESSF	wcp	3	32	ESSFwcp3/32	2	4	5	6	N	6	5	5	5	5	1	5	6

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	ESSFwcp3	ESSF	wcp	3	32	ESSFwcp3/32	3	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	32	ESSFwcp3/32	4	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	32	ESSFwcp3/32	5	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	32	ESSFwcp3/32	6	4	5	6	N	6	5	5	5	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	32	ESSFwcp3/32	7	4	5	6	N	6	5	5	5	5	1	5	6
1	ESSFwcp3	ESSF	wcp	3	32	ESSFwcp3/32		4	5	6	N	6	5	5	5	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	33	ESSFwcp3/33	2	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	33	ESSFwcp3/33	3	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	33	ESSFwcp3/33	4	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	33	ESSFwcp3/33	5	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	33	ESSFwcp3/33	6	4	5	6	N	5	3	5	4	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	33	ESSFwcp3/33	7	4	5	6	N	5	3	5	4	5	1	5	6
1	ESSFwcp3	ESSF	wcp	3	33	ESSFwcp3/33		4	5	6	N	5	3	5	4	5	1	5	6
	ESSFwcp3	ESSF	wcp	3	34	ESSFwcp3/34	2	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFwcp3	ESSF	wcp	3	34	ESSFwcp3/34	3	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFwcp3	ESSF	wcp	3	34	ESSFwcp3/34	4	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFwcp3	ESSF	wcp	3	34	ESSFwcp3/34	5	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFwcp3	ESSF	wcp	3	34	ESSFwcp3/34	6	4	5	6	N	5	3	5	2	5	5	5	6
	ESSFwcp3	ESSF	wcp	3	34	ESSFwcp3/34	7	4	5	6	N	5	3	5	2	5	5	5	6
1	ESSFwcp3	ESSF	wcp	3	34	ESSFwcp3/34		4	5	6	N	5	3	5	2	5	5	5	6
1	ESSFwcp3	ESSF	wcp	3	BI	ESSFwcp3/BI	2	4	5	6	N	6	6	6	6	6	6	5	6
1	ESSFwcp3	ESSF	wcp	3	LA	ESSFwcp3/LA	2	6	6	6	N	6	4	6	6	6	6	5	6
	ESSFwk2	ESSF	wk	2	01	ESSFwk2/01	2	4	5	6	N	6	5	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	01	ESSFwk2/01	3	4	5	6	N	5	3	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	01	ESSFwk2/01	4	4	5	6	N	5	3	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	01	ESSFwk2/01	5	4	5	6	N	5	3	4	3	4	5	4	6
	ESSFwk2	ESSF	wk	2	01	ESSFwk2/01	6	4	5	6	N	5	3	4	3	4	5	3	6
	ESSFwk2	ESSF	wk	2	01	ESSFwk2/01	7	4	5	6	N	5	3	4	3	4	5	3	6
1	ESSFwk2	ESSF	wk	2	01	ESSFwk2/01		4	5	6	N	5	3	4	3	4	5	3	6
	ESSFwk2	ESSF	wk	2	02	ESSFwk2/02	2	4	5	6	N	6	5	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	02	ESSFwk2/02	3	4	5	6	N	5	3	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	02	ESSFwk2/02	4	4	5	6	N	5	3	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	02	ESSFwk2/02	5	4	5	6	N	5	3	4	3	4	5	5	6
	ESSFwk2	ESSF	wk	2	02	ESSFwk2/02	6	4	5	6	N	5	3	4	3	4	5	5	6
	ESSFwk2	ESSF	wk	2	02	ESSFwk2/02	7	4	5	6	N	5	3	4	3	4	5	5	6
1	ESSFwk2	ESSF	wk	2	02	ESSFwk2/02		4	5	6	N	5	3	4	3	4	5	5	6
	ESSFwk2	ESSF	wk	2	03	ESSFwk2/03	2	4	5	6	N	6	5	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	03	ESSFwk2/03	3	4	5	6	N	5	3	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	03	ESSFwk2/03	4	4	5	6	N	5	3	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	03	ESSFwk2/03	5	4	5	6	N	5	3	4	3	3	5	4	6
	ESSFwk2	ESSF	wk	2	03	ESSFwk2/03	6	4	5	6	N	5	3	4	3	3	5	3	6
	ESSFwk2	ESSF	wk	2	03	ESSFwk2/03	7	4	5	6	N	5	3	4	3	3	5	3	6
1	ESSFwk2	ESSF	wk	2	03	ESSFwk2/03		4	5	6	N	5	3	4	3	3	5	3	6
	ESSFwk2	ESSF	wk	2	04	ESSFwk2/04	2	4	5	6	N	6	5	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	04	ESSFwk2/04	3	4	5	6	N	5	4	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	04	ESSFwk2/04	4	4	5	6	N	5	4	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	04	ESSFwk2/04	5	4	5	6	N	5	4	4	3	3	5	4	6
	ESSFwk2	ESSF	wk	2	04	ESSFwk2/04	6	4	5	6	N	5	4	4	3	3	5	3	6
	ESSFwk2	ESSF	wk	2	04	ESSFwk2/04	7	4	5	6	N	5	4	4	3	3	5	3	6
1	ESSFwk2	ESSF	wk	2	04	ESSFwk2/04		4	5	6	N	5	4	4	3	3	5	3	6
	ESSFwk2	ESSF	wk	2	05	ESSFwk2/05	2	4	5	6	N	6	5	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	05	ESSFwk2/05	3	4	5	6	N	5	3	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	05	ESSFwk2/05	4	4	5	6	N	5	3	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	05	ESSFwk2/05	5	4	5	6	N	5	3	4	3	3	5	5	6
	ESSFwk2	ESSF	wk	2	05	ESSFwk2/05	6	4	5	6	N	5	3	4	3	3	5	4	6
	ESSFwk2	ESSF	wk	2	05	ESSFwk2/05	7	4	5	6	N	5	3	4	3	3	5	4	6
1	ESSFwk2	ESSF	wk	2	05	ESSFwk2/05		4	5	6	N	5	3	4	3	3	5	4	6
	ESSFwk2	ESSF	wk	2	06	ESSFwk2/06	2	4	5	6	N	6	5	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	06	ESSFwk2/06	3	4	5	6	N	5	3	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	06	ESSFwk2/06	4	4	5	6	N	5	3	4	3	3	6	5	6
	ESSFwk2	ESSF	wk	2	06	ESSFwk2/06	5	4	5	6	N	5	3	4	3	3	5	5	6
	ESSFwk2	ESSF	wk	2	06	ESSFwk2/06	6	4	5	6	N	5	3	4	3	3	5	4	6
	ESSFwk2	ESSF	wk	2	06	ESSFwk2/06	7	4	5	6	N	5	3	4	3	3	5	4	6
1	ESSFwk2	ESSF	wk	2	06	ESSFwk2/06		4	5	6	N	5	3	4	3	3	5	4	6
	ESSFwk2	ESSF	wk	2	31	ESSFwk2/31	2	4	5	6	N	6	5	5	3	5	6	5	6
	ESSFwk2	ESSF	wk	2	31	ESSFwk2/31	3	4	5	6	N	5	3	5	3	5	6	5	6
	ESSFwk2	ESSF	wk	2	31	ESSFwk2/31	4	4	5	6	N	5	3	5	3	5	6	5	6

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	ESSFwk2	ESSF	wk	2	31	ESSFwk2/31	5	4	5	6	N	5	3	5	3	5	6	5	6
	ESSFwk2	ESSF	wk	2	31	ESSFwk2/31	6	4	5	6	N	5	3	5	3	5	6	5	6
	ESSFwk2	ESSF	wk	2	31	ESSFwk2/31	7	4	5	6	N	5	3	5	3	5	6	5	6
1	ESSFwk2	ESSF	wk	2	31	ESSFwk2/31		4	5	6	N	5	3	5	3	5	6	5	6
	ESSFwk2	ESSF	wk	2	32	ESSFwk2/32	2	4	5	6	N	6	5	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	32	ESSFwk2/32	3	4	5	6	N	5	4	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	32	ESSFwk2/32	4	4	5	6	N	5	4	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	32	ESSFwk2/32	5	4	5	6	N	5	4	4	3	4	6	5	6
	ESSFwk2	ESSF	wk	2	32	ESSFwk2/32	6	4	5	6	N	5	4	4	3	4	6	4	6
	ESSFwk2	ESSF	wk	2	32	ESSFwk2/32	7	4	5	6	N	5	4	4	3	4	6	4	6
1	ESSFwk2	ESSF	wk	2	32	ESSFwk2/32		4	5	6	N	5	4	4	3	4	6	4	6
	ESSFwk2	ESSF	wk	2	33	ESSFwk2/33	2	4	5	6	N	6	5	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	33	ESSFwk2/33	3	4	5	6	N	5	4	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	33	ESSFwk2/33	4	4	5	6	N	5	4	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	33	ESSFwk2/33	5	4	5	6	N	5	4	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	33	ESSFwk2/33	6	4	5	6	N	5	4	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	33	ESSFwk2/33	7	4	5	6	N	5	4	5	2	5	6	5	6
1	ESSFwk2	ESSF	wk	2	33	ESSFwk2/33		4	5	6	N	5	4	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	34	ESSFwk2/34	2	4	5	6	N	6	5	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	34	ESSFwk2/34	3	4	5	6	N	5	3	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	34	ESSFwk2/34	4	4	5	6	N	5	3	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	34	ESSFwk2/34	5	4	5	6	N	5	3	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	34	ESSFwk2/34	6	4	5	6	N	5	3	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	34	ESSFwk2/34	7	4	5	6	N	5	3	5	2	5	6	5	6
1	ESSFwk2	ESSF	wk	2	34	ESSFwk2/34		4	5	6	N	5	3	5	2	5	6	5	6
	ESSFwk2	ESSF	wk	2	35	ESSFwk2/35	2	4	5	6	N	6	5	6	3	6	6	5	6
	ESSFwk2	ESSF	wk	2	35	ESSFwk2/35	3	4	5	6	N	5	5	6	3	6	6	5	6
	ESSFwk2	ESSF	wk	2	35	ESSFwk2/35	4	4	5	6	N	5	5	6	3	6	6	5	6
	ESSFwk2	ESSF	wk	2	35	ESSFwk2/35	5	4	5	6	N	5	5	6	3	6	6	5	6
	ESSFwk2	ESSF	wk	2	35	ESSFwk2/35	6	4	5	6	N	5	5	6	3	6	6	5	6
	ESSFwk2	ESSF	wk	2	35	ESSFwk2/35	7	4	5	6	N	5	5	6	3	6	6	5	6
1	ESSFwk2	ESSF	wk	2	35	ESSFwk2/35		4	5	6	N	5	5	6	3	6	6	5	6
1	ESSFwk2	ESSF	wk	2	LA	ESSFwk2/LA	2	6	6	6	N	5	4	6	6	6	6	6	6
1	ESSFwk2	ESSF	wk	2	RZ	ESSFwk2/RZ	2	6	6	6	N	6	6	6	6	6	6	6	6
	SBSwk2	SBS	wk	2	01	SBSwk2/01	2	5	5	6	N	2	2	2	4	6	6	6	6
	SBSwk2	SBS	wk	2	01	SBSwk2/01	3	5	5	6	N	1	1	2	4	2	6	5	5
	SBSwk2	SBS	wk	2	01	SBSwk2/01	4	5	5	6	N	1	1	4	4	2	6	5	5
	SBSwk2	SBS	wk	2	01	SBSwk2/01	5	5	5	6	M	1	1	4	4	2	6	2	2
	SBSwk2	SBS	wk	2	01	SBSwk2/01	6	5	5	6	M	1	2	4	4	2	6	1	1
	SBSwk2	SBS	wk	2	01	SBSwk2/01	7	5	5	6	M	1	2	4	4	2	6	1	1
1	SBSwk2	SBS	wk	2	01	SBSwk2/01		5	5	6	M	1	1	2	4	2	6	1	1
	SBSwk2	SBS	wk	2	03	SBSwk2/03	2	5	5	6	N	2	2	3	5	6	6	6	6
	SBSwk2	SBS	wk	2	03	SBSwk2/03	3	5	5	6	N	1	1	3	5	3	6	5	5
	SBSwk2	SBS	wk	2	03	SBSwk2/03	4	5	5	6	N	1	1	4	5	3	6	5	5
	SBSwk2	SBS	wk	2	03	SBSwk2/03	5	5	5	6	L	1	1	4	5	3	6	3	3
	SBSwk2	SBS	wk	2	03	SBSwk2/03	6	5	5	6	L	1	2	4	5	3	6	2	2
	SBSwk2	SBS	wk	2	03	SBSwk2/03	7	5	5	6	L	1	2	4	5	3	6	2	2
1	SBSwk2	SBS	wk	2	03	SBSwk2/03		5	5	6	L	1	1	3	5	3	6	2	2
	SBSwk2	SBS	wk	2	04	SBSwk2/04	2	5	5	6	N	2	2	3	4	6	6	6	6
	SBSwk2	SBS	wk	2	04	SBSwk2/04	3	5	5	6	N	1	1	3	4	3	6	5	5
	SBSwk2	SBS	wk	2	04	SBSwk2/04	4	5	5	6	N	1	1	4	4	3	6	5	5
	SBSwk2	SBS	wk	2	04	SBSwk2/04	5	5	5	6	L	1	1	4	4	3	6	4	4
	SBSwk2	SBS	wk	2	04	SBSwk2/04	6	5	5	6	L	1	2	4	4	3	6	4	4
	SBSwk2	SBS	wk	2	04	SBSwk2/04	7	5	5	6	L	1	2	4	4	3	6	4	4
1	SBSwk2	SBS	wk	2	04	SBSwk2/04		5	5	6	L	1	1	3	4	3	6	4	4
	SBSwk2	SBS	wk	2	05	SBSwk2/05	2	5	5	6	N	2	2	3	3	6	6	6	6
	SBSwk2	SBS	wk	2	05	SBSwk2/05	3	5	5	6	N	1	1	3	3	2	6	5	5
	SBSwk2	SBS	wk	2	05	SBSwk2/05	4	5	5	6	N	1	1	4	3	2	6	5	5
	SBSwk2	SBS	wk	2	05	SBSwk2/05	5	5	5	6	M	1	1	4	3	2	6	2	2
	SBSwk2	SBS	wk	2	05	SBSwk2/05	6	5	5	6	M	1	2	4	3	2	6	2	2
	SBSwk2	SBS	wk	2	05	SBSwk2/05	7	5	5	6	M	1	2	4	3	2	6	1	1
1	SBSwk2	SBS	wk	2	05	SBSwk2/05		5	5	6	M	1	1	3	3	2	6	1	1
	SBSwk2	SBS	wk	2	07	SBSwk2/07	2	5	5	6	N	2	2	5	5	6	6	6	6
	SBSwk2	SBS	wk	2	07	SBSwk2/07	3	5	5	6	N	1	1	5	5	4	6	5	5
	SBSwk2	SBS	wk	2	07	SBSwk2/07	4	5	5	6	N	1	1	5	5	4	6	5	5
	SBSwk2	SBS	wk	2	07	SBSwk2/07	5	5	5	6	N	1	1	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	07	SBSwk2/07	6	5	5	6	N	1	2	5	5	4	6	4	5

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	SBSwk2	SBS	wk	2	07	SBSwk2/07	7	5	5	6	N	1	2	5	5	4	6	4	5
1	SBSwk2	SBS	wk	2	07	SBSwk2/07		5	5	6	N	1	1	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	31	SBSwk2/31	2	5	5	6	N	2	2	3	3	6	6	6	6
	SBSwk2	SBS	wk	2	31	SBSwk2/31	3	5	5	6	N	1	1	3	3	3	6	5	5
	SBSwk2	SBS	wk	2	31	SBSwk2/31	4	5	5	6	N	1	1	4	3	3	6	5	5
	SBSwk2	SBS	wk	2	31	SBSwk2/31	5	5	5	6	N	1	1	4	3	3	6	3	3
	SBSwk2	SBS	wk	2	31	SBSwk2/31	6	5	5	6	N	1	2	4	3	3	6	2	3
	SBSwk2	SBS	wk	2	31	SBSwk2/31	7	5	5	6	N	1	2	4	3	3	6	2	3
1	SBSwk2	SBS	wk	2	31	SBSwk2/31		5	5	6	N	1	1	3	3	3	6	2	3
	SBSwk2	SBS	wk	2	32	SBSwk2/32	2	5	5	6	N	2	2	3	4	6	6	6	6
	SBSwk2	SBS	wk	2	32	SBSwk2/32	3	5	5	6	N	1	1	3	4	3	6	5	5
	SBSwk2	SBS	wk	2	32	SBSwk2/32	4	5	5	6	N	1	1	4	4	3	6	5	5
	SBSwk2	SBS	wk	2	32	SBSwk2/32	5	5	5	6	L	1	1	4	4	3	6	3	3
	SBSwk2	SBS	wk	2	32	SBSwk2/32	6	5	5	6	L	1	2	4	4	3	6	2	2
	SBSwk2	SBS	wk	2	32	SBSwk2/32	7	5	5	6	L	1	2	4	4	3	6	2	2
1	SBSwk2	SBS	wk	2	32	SBSwk2/32		5	5	6	L	1	1	3	4	3	6	2	2
	SBSwk2	SBS	wk	2	33	SBSwk2/33	2	5	5	6	N	2	2	3	4	6	6	6	6
	SBSwk2	SBS	wk	2	33	SBSwk2/33	3	5	5	6	N	1	1	3	4	4	6	5	5
	SBSwk2	SBS	wk	2	33	SBSwk2/33	4	5	5	6	N	1	1	4	4	4	6	5	5
	SBSwk2	SBS	wk	2	33	SBSwk2/33	5	5	5	6	N	1	1	4	4	4	6	4	5
	SBSwk2	SBS	wk	2	33	SBSwk2/33	6	5	5	6	N	1	2	4	4	4	6	4	5
	SBSwk2	SBS	wk	2	33	SBSwk2/33	7	5	5	6	N	1	2	4	4	4	6	4	5
1	SBSwk2	SBS	wk	2	33	SBSwk2/33		5	5	6	N	1	1	3	4	4	6	4	5
	SBSwk2	SBS	wk	2	34	SBSwk2/34	2	5	5	6	N	2	2	5	5	6	6	6	6
	SBSwk2	SBS	wk	2	34	SBSwk2/34	3	5	5	6	N	1	1	5	5	4	6	5	5
	SBSwk2	SBS	wk	2	34	SBSwk2/34	4	5	5	6	N	1	1	5	5	4	6	5	5
	SBSwk2	SBS	wk	2	34	SBSwk2/34	5	5	5	6	N	1	1	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	34	SBSwk2/34	6	5	5	6	N	1	2	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	34	SBSwk2/34	7	5	5	6	N	1	2	5	5	4	6	4	5
1	SBSwk2	SBS	wk	2	34	SBSwk2/34		5	5	6	N	1	1	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	35	SBSwk2/35	2	5	5	6	N	2	2	6	6	6	6	6	6
	SBSwk2	SBS	wk	2	35	SBSwk2/35	3	5	5	6	N	1	1	6	6	6	6	5	5
	SBSwk2	SBS	wk	2	35	SBSwk2/35	4	5	5	6	N	1	1	6	6	6	6	5	5
	SBSwk2	SBS	wk	2	35	SBSwk2/35	5	5	5	6	N	1	1	6	6	6	6	5	6
	SBSwk2	SBS	wk	2	35	SBSwk2/35	6	5	5	6	N	1	2	6	6	6	6	5	6
	SBSwk2	SBS	wk	2	35	SBSwk2/35	7	5	5	6	N	1	2	6	6	6	6	5	6
1	SBSwk2	SBS	wk	2	35	SBSwk2/35		5	5	6	N	1	1	6	6	6	6	5	5
1	SBSwk2	SBS	wk	2	BI	SBSwk2/BI	2	5	5	6	N	6	6	6	6	6	6	6	6
1	SBSwk2	SBS	wk	2	CB	SBSwk2/CB	2	5	5	6	N	6	6	6	6	6	6	6	6
1	SBSwk2	SBS	wk	2	ES	SBSwk2/ES	2	5	5	6	N	6	6	6	6	6	6	6	6
1	SBSwk2	SBS	wk	2	GB	SBSwk2/GB	2	5	5	6	N	6	4	6	6	6	6	6	6
1	SBSwk2	SBS	wk	2	LA	SBSwk2/LA	2	6	6	6	N	4	3	6	6	6	6	6	6
1	SBSwk2	SBS	wk	2	RE	SBSwk2/RE	2	6	6	6	N	4	3	6	6	6	6	6	6
1	SBSwk2	SBS	wk	2	RI	SBSwk2/RI	2	6	6	6	N	6	5	6	6	6	6	6	6
1	SBSwk2	SBS	wk	2	RZ	SBSwk2/RZ	2	6	6	6	N	6	6	6	6	6	6	6	6
	BWBSmw1	BWBS	mw	1	01	BWBSmw1/01	2	5	5	6	N	1	1	3	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	01	BWBSmw1/01	3	5	5	6	N	1	1	3	4	4	6	5	6
	BWBSmw1	BWBS	mw	1	01	BWBSmw1/01	4	5	5	6	N	1	1	4	4	4	6	5	6
	BWBSmw1	BWBS	mw	1	01	BWBSmw1/01	5	5	5	6	M	2	2	4	4	4	5	3	4
	BWBSmw1	BWBS	mw	1	01	BWBSmw1/01	6	5	5	6	H	2	2	4	4	4	5	2	3
	BWBSmw1	BWBS	mw	1	01	BWBSmw1/01	7	5	5	6	H	2	2	4	4	4	5	1	3
1	BWBSmw1	BWBS	mw	1	01	BWBSmw1/01		5	5	6	H	1	1	3	4	4	5	1	3
	BWBSmw1	BWBS	mw	1	02	BWBSmw1/02	2	5	5	6	N	1	1	2	5	6	6	5	6
	BWBSmw1	BWBS	mw	1	02	BWBSmw1/02	3	5	5	6	N	1	1	2	5	3	6	5	6
	BWBSmw1	BWBS	mw	1	02	BWBSmw1/02	4	5	5	6	N	1	1	4	5	3	6	5	6
	BWBSmw1	BWBS	mw	1	02	BWBSmw1/02	5	5	5	6	L	1	1	4	5	3	5	4	6
	BWBSmw1	BWBS	mw	1	02	BWBSmw1/02	6	5	5	6	L	1	1	4	5	3	5	3	6
	BWBSmw1	BWBS	mw	1	02	BWBSmw1/02	7	5	5	6	L	1	1	4	5	3	5	2	6
1	BWBSmw1	BWBS	mw	1	02	BWBSmw1/02		5	5	6	L	1	1	2	5	3	5	2	6
	BWBSmw1	BWBS	mw	1	03	BWBSmw1/03	2	5	5	6	N	1	1	2	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	03	BWBSmw1/03	3	5	5	6	N	1	1	2	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	03	BWBSmw1/03	4	5	5	6	N	1	1	4	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	03	BWBSmw1/03	5	5	5	6	N	1	1	4	4	3	5	4	6
	BWBSmw1	BWBS	mw	1	03	BWBSmw1/03	6	5	5	6	N	1	1	4	4	3	5	3	6
	BWBSmw1	BWBS	mw	1	03	BWBSmw1/03	7	5	5	6	N	1	1	4	4	3	5	2	6
1	BWBSmw1	BWBS	mw	1	03	BWBSmw1/03		5	5	6	N	1	1	2	4	3	5	2	6
	BWBSmw1	BWBS	mw	1	03$	BWBSmw1/03$	2	5	5	6	N	1	1	2	4	6	6	5	6

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	BWBSmw1	BWBS	mw	1	03$	BWBSmw1/03$	3	5	5	6	N	1	1	2	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	03$	BWBSmw1/03$	4	5	5	6	N	1	1	4	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	03$	BWBSmw1/03$	5	5	5	6	N	1	1	4	4	3	6	4	6
	BWBSmw1	BWBS	mw	1	03$	BWBSmw1/03$	6	5	5	6	N	1	1	4	4	3	6	3	6
	BWBSmw1	BWBS	mw	1	03$	BWBSmw1/03$	7	5	5	6	N	1	1	4	4	3	6	2	6
1	BWBSmw1	BWBS	mw	1	03$	BWBSmw1/03$		5	5	6	N	1	1	2	4	3	6	2	6
	BWBSmw1	BWBS	mw	1	04	BWBSmw1/04	2	5	5	6	N	3	3	5	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	04	BWBSmw1/04	3	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	04	BWBSmw1/04	4	5	5	6	N	3	3	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	04	BWBSmw1/04	5	5	5	6	N	2	2	5	4	3	5	5	6
	BWBSmw1	BWBS	mw	1	04	BWBSmw1/04	6	5	5	6	N	2	2	5	4	3	5	5	6
	BWBSmw1	BWBS	mw	1	04	BWBSmw1/04	7	5	5	6	N	2	2	5	4	3	5	5	6
1	BWBSmw1	BWBS	mw	1	04	BWBSmw1/04		5	5	6	N	1	1	5	4	3	5	5	6
	BWBSmw1	BWBS	mw	1	06	BWBSmw1/06	2	5	5	6	N	1	1	2	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	06	BWBSmw1/06	3	5	5	6	N	1	1	2	4	2	6	5	6
	BWBSmw1	BWBS	mw	1	06	BWBSmw1/06	4	5	5	6	N	1	1	4	4	2	6	5	6
	BWBSmw1	BWBS	mw	1	06	BWBSmw1/06	5	5	5	6	M	2	2	4	4	2	5	3	4
	BWBSmw1	BWBS	mw	1	06	BWBSmw1/06	6	5	5	6	M	2	2	4	4	2	5	2	3
	BWBSmw1	BWBS	mw	1	06	BWBSmw1/06	7	5	5	6	M	2	2	4	4	2	5	1	3
1	BWBSmw1	BWBS	mw	1	06	BWBSmw1/06		5	5	6	M	1	1	2	4	2	5	1	3
	BWBSmw1	BWBS	mw	1	07	BWBSmw1/07	2	5	5	6	N	1	1	3	5	6	6	5	6
	BWBSmw1	BWBS	mw	1	07	BWBSmw1/07	3	5	5	6	N	1	1	3	5	2	6	5	6
	BWBSmw1	BWBS	mw	1	07	BWBSmw1/07	4	5	5	6	N	1	1	4	5	2	6	5	6
	BWBSmw1	BWBS	mw	1	07	BWBSmw1/07	5	5	5	6	M	1	1	4	5	2	6	3	4
	BWBSmw1	BWBS	mw	1	07	BWBSmw1/07	6	5	5	6	M	1	1	4	5	2	6	2	3
	BWBSmw1	BWBS	mw	1	07	BWBSmw1/07	7	5	5	6	M	1	1	4	5	2	6	1	3
1	BWBSmw1	BWBS	mw	1	07	BWBSmw1/07		5	5	6	M	1	1	3	5	2	6	1	3
	BWBSmw1	BWBS	mw	1	08	BWBSmw1/08	2	5	5	6	N	1	1	5	4	6	6	5	6
	BWBSmw1	BWBS	mw	1	08	BWBSmw1/08	3	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	08	BWBSmw1/08	4	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	08	BWBSmw1/08	5	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	08	BWBSmw1/08	6	5	5	6	N	1	1	5	4	3	6	5	6
	BWBSmw1	BWBS	mw	1	08	BWBSmw1/08	7	5	5	6	N	1	1	5	4	3	6	5	6
1	BWBSmw1	BWBS	mw	1	08	BWBSmw1/08		5	5	6	N	1	1	5	4	3	6	5	6
	BWBSwk1	BWBS	wk	1	03	BWBSwk1/03	2	5	5	6	N	4	3	5	4	6	6	5	6
	BWBSwk1	BWBS	wk	1	03	BWBSwk1/03	3	5	5	6	N	3	1	5	4	3	6	5	6
	BWBSwk1	BWBS	wk	1	03	BWBSwk1/03	4	5	5	6	N	3	1	5	4	2	6	5	6
	BWBSwk1	BWBS	wk	1	03	BWBSwk1/03	5	5	5	6	N	3	2	5	4	2	5	4	6
	BWBSwk1	BWBS	wk	1	03	BWBSwk1/03	6	5	5	6	N	3	2	5	4	2	5	4	6
	BWBSwk1	BWBS	wk	1	03	BWBSwk1/03	7	5	5	6	N	3	2	5	4	2	5	4	6
1	BWBSwk1	BWBS	wk	1	03	BWBSwk1/03		5	5	6	N	3	1	5	4	2	5	4	6
	BWBSwk1	BWBS	wk	1	05	BWBSwk1/05	2	5	5	6	N	4	3	2	3	6	6	5	6
	BWBSwk1	BWBS	wk	1	05	BWBSwk1/05	3	5	5	6	N	3	1	2	3	3	6	5	6
	BWBSwk1	BWBS	wk	1	05	BWBSwk1/05	4	5	5	6	N	3	1	4	3	2	6	4	6
	BWBSwk1	BWBS	wk	1	05	BWBSwk1/05	5	5	5	6	M	3	2	4	3	2	5	3	3
	BWBSwk1	BWBS	wk	1	05	BWBSwk1/05	6	5	5	6	M	3	2	4	3	2	5	2	2
	BWBSwk1	BWBS	wk	1	05	BWBSwk1/05	7	5	5	6	M	3	2	4	3	2	5	2	2
1	BWBSwk1	BWBS	wk	1	05	BWBSwk1/05		5	5	6	M	3	1	2	3	2	5	2	2
	BWBSwk1	BWBS	wk	1	06	BWBSwk1/06	2	5	5	6	N	4	3	2	3	6	6	5	6
	BWBSwk1	BWBS	wk	1	06	BWBSwk1/06	3	5	5	6	N	3	1	2	3	3	6	5	6
	BWBSwk1	BWBS	wk	1	06	BWBSwk1/06	4	5	5	6	N	3	1	4	3	2	6	4	6
	BWBSwk1	BWBS	wk	1	06	BWBSwk1/06	5	5	5	6	M	3	2	4	3	2	5	3	3
	BWBSwk1	BWBS	wk	1	06	BWBSwk1/06	6	5	5	6	M	3	2	4	3	2	5	2	2
	BWBSwk1	BWBS	wk	1	06	BWBSwk1/06	7	5	5	6	M	3	2	4	3	2	5	2	2
1	BWBSwk1	BWBS	wk	1	06	BWBSwk1/06		5	5	6	M	3	1	2	3	2	5	2	2
	ESSFmv2	ESSF	mv	2	01	ESSFmv2/01	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	01	ESSFmv2/01	3	4	5	6	N	5	3	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	01	ESSFmv2/01	4	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	01	ESSFmv2/01	5	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	01	ESSFmv2/01	6	4	5	6	N	5	3	4	3	2	5	4	6
	ESSFmv2	ESSF	mv	2	01	ESSFmv2/01	7	4	5	6	N	5	5	4	3	2	5	4	6
1	ESSFmv2	ESSF	mv	2	01	ESSFmv2/01		4	5	6	N	5	3	4	3	2	5	4	6
	ESSFmv2	ESSF	mv	2	02	ESSFmv2/02	2	4	5	6	N	6	6	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	02	ESSFmv2/02	3	4	5	6	N	5	3	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	02	ESSFmv2/02	4	4	5	6	N	5	3	4	3	3	6	6	6
	ESSFmv2	ESSF	mv	2	02	ESSFmv2/02	5	4	5	6	N	5	3	4	3	3	6	5	6
	ESSFmv2	ESSF	mv	2	02	ESSFmv2/02	6	4	5	6	N	5	3	4	3	3	5	5	6

Capability	BGC_Unit	BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	BGC_SS_Concat	Structural_Stage	M_RATA_LI_W	M_RATA_LI_G	M_RATA_RB	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M-MAPE_LI_A	M_MAPE_BI
	ESSFmv2	ESSF	mv	2	02	ESSFmv2/02	7	4	5	6	N	5	5	4	3	3	5	5	6
1	ESSFmv2	ESSF	mv	2	02	ESSFmv2/02		4	5	6	N	5	3	4	3	3	5	5	6
	ESSFmv2	ESSF	mv	2	04	ESSFmv2/04	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	04	ESSFmv2/04	3	4	5	6	N	2	1	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	04	ESSFmv2/04	4	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	04	ESSFmv2/04	5	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	04	ESSFmv2/04	6	4	5	6	N	5	3	4	3	2	5	4	6
	ESSFmv2	ESSF	mv	2	04	ESSFmv2/04	7	4	5	6	N	5	5	4	3	2	5	4	6
1	ESSFmv2	ESSF	mv	2	04	ESSFmv2/04		4	5	6	N	2	1	4	3	2	5	4	6
	ESSFmv2	ESSF	mv	2	06	ESSFmv2/06	2	4	5	6	N	6	5	4	3	5	6	6	6
	ESSFmv2	ESSF	mv	2	06	ESSFmv2/06	3	4	5	6	N	5	3	4	3	5	6	5	6
	ESSFmv2	ESSF	mv	2	06	ESSFmv2/06	4	4	5	6	N	5	3	4	3	2	6	5	6
	ESSFmv2	ESSF	mv	2	06	ESSFmv2/06	5	4	5	6	N	5	3	4	3	2	6	4	6
	ESSFmv2	ESSF	mv	2	06	ESSFmv2/06	6	4	5	6	N	5	3	4	3	2	5	4	6
	ESSFmv2	ESSF	mv	2	06	ESSFmv2/06	7	4	5	6	N	5	3	4	3	2	5	3	6
1	ESSFmv2	ESSF	mv	2	06	ESSFmv2/06		4	5	6	N	5	3	4	3	2	5	3	6
	SBSwk2	SBS	wk	2	02	SBSwk2/02	2	5	5	6	N	2	2	5	5	6	6	6	6
	SBSwk2	SBS	wk	2	02	SBSwk2/02	3	5	5	6	N	1	1	5	5	4	6	5	5
	SBSwk2	SBS	wk	2	02	SBSwk2/02	4	5	5	6	N	1	1	5	5	4	6	5	5
	SBSwk2	SBS	wk	2	02	SBSwk2/02	5	5	5	6	N	1	1	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	02	SBSwk2/02	6	5	5	6	N	1	2	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	02	SBSwk2/02	7	5	5	6	N	1	2	5	5	4	6	4	5
1	SBSwk2	SBS	wk	2	02	SBSwk2/02		5	5	6	N	1	1	5	5	4	6	4	5
	SBSwk2	SBS	wk	2	06	SBSwk2/06	2	5	5	6	N	2	2	2	3	6	6	6	6
	SBSwk2	SBS	wk	2	06	SBSwk2/06	3	5	5	6	N	1	1	2	3	3	6	5	5
	SBSwk2	SBS	wk	2	06	SBSwk2/06	4	5	5	6	N	1	1	4	3	3	6	5	5
	SBSwk2	SBS	wk	2	06	SBSwk2/06	5	5	5	6	M	1	1	4	3	3	6	2	2
	SBSwk2	SBS	wk	2	06	SBSwk2/06	6	5	5	6	M	1	2	4	3	3	6	1	1
	SBSwk2	SBS	wk	2	06	SBSwk2/06	7	5	5	6	M	1	2	4	3	3	6	1	1
1	SBSwk2	SBS	wk	2	06	SBSwk2/06		5	5	6	M	1	1	2	3	3	6	1	1

APPENDIX C FIELD DATA

Project_ID	Inspection_Type	Photo	Date	Surveyors	Plot_No	Plan_Site_No	UTM_Zone	UTM_N	UTM_E	Aspect	Elevation(m)	Slope	SMR	SNR	Meso_Slope_Pos	Drainage	Moist_SubC	Min_Soil_Texture	Org_Soil_Texture	Surf_Org_Thickness	Hum_Form	R_Restriction_Layer_Depth (cm)	R_Restriction_Layer_Type	Coarse_Frag_C	BGC_Unit	Site_Series	Structural_Stage_mod	Structural_Stage	Site_Modifiers	Crown_Closure(%)
WHR_MurrayR	G	1, 2, 3, 4, 5	18-Oct-10	CM/SA	201	Road100	10	6113883	621752	E	919	12	4	C	Upper Slope	Well	Perhumid	Silty		0-40	Mor		N	<20%	BWBSmw1	01		6		35
WHR_MurrayR	V	6, 7, 8, 9, 10	18-Oct-10	CM/SA	202		10	6112722	619550	SE	1020	10													BWBSwk1	01		1		0
WHR_MurrayR	V	11, 12, 13, 14, 15	18-Oct-10	CM/SA	203	Road094	10	6110744	618889	S	827	3													BWBSmw1	06		1		0
WHR_MurrayR	G	16, 17, 18	18-Oct-10	CM/SA	204	Road097	10	6111663	618396			0	4	D	Level	Imperfectly		Silty		0-40	Mor			<20%	BWBSmw1	03$	b	3	as	10
WHR_MurrayR	G	19, 20, 21, 22, 23, 24	19-Oct-10	CM/SA	205	Heli010	10	6084723	609513	S	1662	15		D	Crest	Very Rapidly		Loamy		0-40	Mull	12	L	<20%	AT		d	2		0
WHR_MurrayR	V	25, 26	19-Oct-10	CM/SA	206	Heli009	10	6085288	610465	NE					Mid Slope										ESSFmv2	01		7		75
WHR_MurrayR	G	27, 28, 29, 30, 31, 32	19-Oct-10	CM/SA	207	near Heli115	10	6086656	608719	SE	1590	26	6	D	Mid Slope	Very Poorly	Aquic		Humic	0-40	Moder	10	W		ESSFmv2	06	a	3		10
WHR_MurrayR	V	33, 35	19-Oct-10	CM/SA	208	Heli008	10	6086598	610200	SE	1550	30			Mid Slope	Mod. Well									ESSFmv2	01		7		75
WHR_MurrayR	V	36, 37	19-Oct-10	CM/SA	209	Heli014	10	6087452	608987	S	1700	30			Crest	Very Rapidly									ESSFmv2	35		7		10
WHR_MurrayR	V	38, 39	19-Oct-10	CM/SA	210	Heli013	10	6088170	609742		1590	35			Upper Slope	Very Rapidly									ESSFmv2	02		7		
WHR_MurrayR	G	41, 42, 43, 44, 45, 46	19-Oct-10	CM/SA	211	Heli007	10	6088503	609120	N	1373	4	5	C	Mid Slope	Mod. Well		Clayey		0-40	Mor		L	<20%	ESSFmv2	04		7		70
WHR_MurrayR	G	47, 48, 49, 50, 51	19-Oct-10	CM/SA	212	Heli112	10	6089509	610798	Flat	1006	0	5	C	Level	Rapidly		Loamy		0-40	Mor		N	<20%	SBSwk2	06		6		
WHR_MurrayR	G	52, 53, 54, 55, 56	19-Oct-10	CM/SA	213		10	6094027	612091	SW	1621		6	B	Lower Slope	Imperfectly		Silty		0-40	Mor			<20%	ESSFmv2	04		5		
WHR_MurrayR	G	57, 58, 59, 60, 61	19-Oct-10	CM/SA	214	Heli019	10	6093973	612160	SW	1618	3													ESSFmv2	02	b	2		
WHR_MurrayR	V	64	19-Oct-10	CM/SA	216	Heli017	10	6093644	611538	SW															ESSFmv2	02		7		
WHR_MurrayR	V	65, 66	19-Oct-10	CM/SA	217	Heli018	10	6094358	610846	W		20													ESSFmvp2	33		6		0
WHR_MurrayR	V	67, 68, 69	19-Oct-10	CM/SA	218	Heli100	10	6096216	610449	W		60			Crest										ESSFmv2	02				
WHR_MurrayR	V	70, 71	19-Oct-10	CM/SA	219	Heli020	10	6096762	610993						Crest										ESSFmvp2	32			K	
WHR_MurrayR	G	73, 74	19-Oct-10	CM/SA	220	Heli108	10	6098009	610647	NNE	1413	35	2	C	Upper Slope	Well		Silty		0-40	Moder			20-35%	ESSFmv2	02		6	K	10
WHR_MurrayR	V	81, 82	19-Oct-10	CM/SA	221	Heili025	10	6099034	610327						Mid Slope										ESSFmvp2	01		6		
WHR_MurrayR	G	83, 84, 85, 86, 87, 88, 89	19-Oct-10	CM/SA	222	Heili026	10	6099824	609461	Flat	852	0	5	E	Toe	Well		Silty		0-40	Mull		N	20-35%	SBSwk2	06		4		15
WHR_MurrayR	G	92, 93, 94, 95, 96	20-Oct-10	CM/SA	223		10	6101552	610898		845	0	5	D	Level	Well		Loamy		0-40	Mull			<20%	SBSwk2	06		7		60
WHR_MurrayR	V	62, 63	19-Oct-10	CM/SA	215	Heli001	10	6093510	611980	SW		15													ESSFmv2	02	a*	1		5
WHR_MurrayR	V	97, 98, 99, 100	20-Oct-10	CM/SA	224	Heli097	10	6101626	610813		836	0			Level	Very Rapidly									SBSwk2	RI				
WHR_MurrayR	V	101	20-Oct-10	CM/SA	225	Heli096	10	6103414	612680																SBSwk2	01				
WHR_MurrayR	V	104, 105	20-Oct-10	CM/SA	226	Heli107	10	6104401	610831																ESSFmv2	02				
WHR_MurrayR	V	106, 107	20-Oct-10	CM/SA	227	Heli104	10	6105280	610614	E		40			Mid Slope										BWBSmw1	05				70
WHR_MurrayR	V	108, 109	20-Oct-10	CM/SA	228		10	6105301	609796	E	1165	40			Crest, Upper Slope										ESSFmv2	02				
WHR_MurrayR	G	110, 111, 112, 113, 114, 115, 116	20-Oct-10	CM/SA	229	Heli032	10	6108405	609625	SE	1312		3	C	Mid Slope	Mod. Well		Clayey			Mor			<20%	ESSFmv2	01		7		55
WHR_MurrayR	G	117, 118, 119, 120, 121, 122, 123	20-Oct-10	CM/SA	230	Heli034	10	6109577	611881	S	1315	40	3	B	Crest	Well		Silty		0-40	Mor			35-70%	ESSFmv2	02		6	W	
WHR_MurrayR	V	124, 125	20-Oct-10	CM/SA	231	Heli036	10	6110678	609088			60			Toe										ESSFmv2	35		7		70
WHR_MurrayR	V	126, 127	20-Oct-10	CM/SA	232	Heli037	10	6112097	609305		1400				Level										ESSFmv2	01		6		50
WHR_MurrayR	V	128, 129	20-Oct-10	CM/SA	233	Heli038	10	6113252	609171						Level										ESSFmv2	02		6		50
WHR_MurrayR	G	130, 131, 132, 133, 134, 135, 136	20-Oct-10	CM/SA	234	Heli039	10	6112986	612807	Flat	1200	0	2	B	Crest	Mod. Well		Silty		0-40	Mor			20-35%	ESSFmv2	02		6		
WHR_MurrayR	G	137, 138, 139, 140, 141	20-Oct-10	CM/SA	235		10	6112957	612844	ESE	1182	50			Upper Slope	Well									ESSFmv2	02		6		
WHR_MurrayR	V	142, 143	20-Oct-10	CM/SA	236	Heli040	10	6113234	613984		1100	15			Mid Slope										BWBSwk1	01				
WHR_MurrayR	V	144, 145	20-Oct-10	CM/SA	237	Heli041	10	6114081	613777		1100	0			Mid Slope, Level										ESSFmv2	01		6		70
WHR_MurrayR	V	146	20-Oct-10	CM/SA	238	Heli042	10	6113114	615570	SE	1100	60													BWBSwk1	02				
WHR_MurrayR	V	147, 148	20-Oct-10	CM/SA	239	Heli043	10	6113579	618970	E	1100	30													BWBSwk1	01		6		70
WHR_MurrayR	V	149, 150	20-Oct-10	CM/SA	240	Heli050	10	6110781	620794	W															BWBSmw1	01				
WHR_MurrayR	V	151, 152	20-Oct-10	CM/SA	241	Heli064	10	6109446	624267		1000														BWBSmw1	05				
WHR_MurrayR	V	153, 154, 155	20-Oct-10	CM/SA	242	Heli048	10	6109361	623366		1000														BWBSmw1	01				
WHR_MurrayR	V		20-Oct-10	CM/SA	243		10	6108762	622267	Flat	1020	0													BWBSwk1	01		7		50
WHR_MurrayR	V	156, 157	20-Oct-10	CM/SA	245		10	6108782	622608	Flat	962	0													BWBSwk1	01		6		
WHR_MurrayR	V	158, 159	20-Oct-10	CM/SA	246	Heli056	10	6108685	621554																BWBSwk1	03				25
WHR_MurrayR	V	160, 161	20-Oct-10	CM/SA	247	Heli131	10	6107919	619366																BWBSwk1	01		6		
WHR_MurrayR	G	162, 163, 164, 165, 166	20-Oct-10	CM/SA	248	Heli132	10	6108429	618805	Flat	1080	0	5	C	Level	Imperfectly		Silty		0-40	Moder			<20%	BWBSwk1	05	s	6		
WHR_MurrayR	V	167, 168	20-Oct-10	CM/SA	249	Heli051	10	6107082	619580	Flat	1100	0													ESSFmv2	31		6		
WHR_MurrayR	V	169, 170	20-Oct-10	CM/SA	250	Heli130	10	6106572	620475																ESSFmv2	01		6		
WHR_MurrayR	V	171, 172	20-Oct-10	CM/SA	251	Heli62	10	6107095	624787	Flat	1000	0													BWBSmw1	04		7		
WHR_MurrayR	V	173, 174	20-Oct-10	CM/SA	252	Heli61	10	6107007	625348		1000														BWBSmw1	04		6		
WHR_MurrayR	G	175, 176, 177, 178, 179	20-Oct-10	CM/SA	253		10	6107039	625456	ESE	809	25	7	C	Mid Slope	Poorly	Aquic	Clayey	Mesic	>40	Mor		N	<20%	BWBSmw1	08		7		
WHR_MurrayR	V	180, 181	20-Oct-10	CM/SA	254	Heli060	10	6106904	625897		850				Level	Well									BWBSmw1	01		6		70
WHR_MurrayR	V	182, 183	20-Oct-10	CM/SA	255	Heli059	10	6104794	626371	Flat	875	0			Toe	Well									BWBSmw1	01		6		60
WHR_MurrayR	G	184, 185, 186, 187, 188, 189, 190	20-Oct-10	CM/SA	256	Heli057	10	6104937	624740	ESE	969	2	5	C	Lower Slope	Poorly	Subaquic	Clayey	Mesic	>40	Mor		N	<20%	BWBSwk1	05		7		45
WHR_MurrayR	V	191, 192	20-Oct-10	CM/SA	257	Heli125	10	6104518	622542	Flat		0													ESSFmv2	03		6		
WHR_MurrayR	V	193, 194	20-Oct-10	CM/SA	258	Heli58	10	6104158	623362	S		50			Lower Slope										ESSFmv2	01		7	W	
WHR_MurrayR	V	195, 196	20-Oct-10	CM/SA	259	Heli124	10	6103302	623205																ESSFmv2	01		7		55
WHR_MurrayR	V	197, 198	20-Oct-10	CM/SA	260	Heli66	10	6100927	624496	S		60													BWBSwk1	04		2	W	0
WHR_MurrayR	V	199, 200	20-Oct-10	CM/SA	261	Heli87	10	6095654	622544	SW		50			Mid Slope										ESSFmv2	01		6	W	
WHR_MurrayR	V	201, 202	20-Oct-10	CM/SA	262	Heli117	10	6095087	622518	SW		40													BWBSwk1	04		4		
WHR_MurrayR	V	203, 204	20-Oct-10	CM/SA	263	Heli88	10	6095464	624418	SE	1000	10			Lower Slope										BWBSmw1	01		4		
WHR_MurrayR	V	205, 206	21-Oct-10	CM/SA	264	Heli113	10	6087380	614165						Level	Very Rapidly									SBSwk2	06		6		
WHR_MurrayR	V	207, 209	21-Oct-10	CM/SA	265	Heli114	10	6087452	608987						Toe, Level										SBSwk2	05		6		
WHR_MurrayR	V	210, 211, 212	21-Oct-10	CM/SA	266	Heli11	10	6086413	612170		1000				Toe, Level										SBSwk2	03	a*	3	W	
WHR_MurrayR	V	213, 214, 215	21-Oct-10	CM/SA	267	Heli12	10	6087031	611827	S	1280	40													ESSFmv2	01		6	K	50
WHR_MurrayR	V	216, 217, 218	21-Oct-10	CM/SA	268	Heli005	10	6088804	613318	S	1219	40			Mid Slope										ESSFmv2	31		5		55
WHR_MurrayR	V	219, 220	21-Oct-10	CM/SA	269	Heli6	10	6089691	612187	SW	1280	25			Mid Slope										ESSFmv2	02		7		60
WHR_MurrayR	G	221 -235	21-Oct-10	CM/SA	270	Heli015	10	6090417	612842	Flat	1429	1	6	C	Depression, Mid Slope	Very Poorly	Peraquic		Mesic	>40	Mor		N	<20%	ESSFmv2	06	a	3		2
WHR_MurrayR	G	236, 237, 238, 239, 240	21-Oct-10	CM/SA	271		10	6090474	612781	SE	1431	25	5	C	Lower Slope	Mod. Well		Clayey		0-40	Mor		N	<20%	ESSFmv2	04		7		45
WHR_MurrayR	V	241, 242, 243	21-Oct-10	CM/SA	272	Heli002	10	6091401	612186	SW	1680	30			Crest										ESSFmv2	02		7		
WHR_MurrayR	V	244, 245, 246	21-Oct-10	CM/SA	273	Heli111	10	6091241	610956	NW	1371	20			Mid Slope										ESSFmv2	01		7		
WHR_MurrayR	V	247, 248	21-Oct-10	CM/SA	274	Heli110	10	6085128	609445	S		10			Mid Slope										ESSFmv2	01		7	K	50
WHR_MurrayR	V	249, 250, 251	21-Oct-10	CM/SA	275	Heli016	10	6092015	613725	S	1340	15			Mid Slope										ESSFmv2	01		7	W	30
WHR_MurrayR	V	252, 253, 254	21-Oct-10	CM/SA	276	Heli004	10	6090351	614023	S	1341	40			Mid Slope										ESSFmv2	01		7		
WHR_MurrayR	V		21-Oct-10	CM/SA	277	VRI-1	10	6089332	619644						Lower Slope										SBSwk2					
WHR_MurrayR	V	258, 259	21-Oct-10	CM/SA	278	VRI-2	10	6089295	620053	Flat		0			Level	Poorly									SBSwk2					
WHR_MurrayR	G	260, 261, 262, 263, 264, 265, 266	21-Oct-10	CM/SA	279	VRI-3	10	6089414	623213	N	1171	18	2	B	Upper Slope	Well		Silty		0-40	Mor		N	20-35%	ESSFmv2	02		6		35
WHR_MurrayR	V	267, 268, 269	21-Oct-10	CM/SA	280		10	6090086	623296	SW	1036	60			Mid Slope										SBSwk2					
WHR_MurrayR	V	270, 271, 272	21-Oct-10	CM/SA	281		10	6090763	624758	Flat					Mid Slope										ESSFmv2					
WHR_MurrayR	V	273, 274, 275, 276, 277	21-Oct-10	CM/SA	282		10	6091871	625181	SW	1341	25			Mid Slope										ESSFmv2			6		
WHR_MurrayR	V	278	21-Oct-10	CM/SA	283		10	6092916	627922	NW		15													ESSFmv2			6		
WHR_MurrayR	V	279, 280	21-Oct-10	CM/SA	284	VRI-4	10	6093812	629777																BWBSwk1					
WHR_MurrayR	V	285, 286, 287	21-Oct-10	CM/SA	285	Heli80	10	6092890	620470	S	1127	60													SBSwk2	02		6	z	5

Project_ID	Inspection_Type	Photo	Date	Surveyors	Plot_No	Plan_Site_No	UTM_Zone	UTM_N	UTM_E	Aspect	Elevation(m)	Slope	SMR	SNR	Meso_Slope_Pos	Drainage	Moist_SubC	Min_Soil_Texture	Org_Soil_Texture	Surf_Org_Thickness	Hum_Form	R_Restriction_Layer_Depth (cm)	R_Restriction_Layer_Type	Coarse_Frag_C	BGC_Unit	Site_Series	Structural_Stage_mod	Structural_Stage	Site_Modifiers	Crown_Closure(%)
WHR_MurrayR	V	288, 289, 290	21-Oct-10	CM/SA	286	Heli116	10	6093656	618421	S	1447	50			Crest, Mid Slope										ESSFmv2	01		6		
WHR_MurrayR	V	291, 292, 293	21-Oct-10	CM/SA	287	Heli079	10	6094831	617711		1341				Level										ESSFmv2	01				50
WHR_MurrayR	V	297 - 302	21-Oct-10	CM/SA	288	Heli077	10	6096334	618784	SE	1499		4	C	Mid Slope						Mor				ESSFmv2	01	a	3	W	0
WHR_MurrayR	G		21-Oct-10	CM/SA	289		10	6096287	618781	SW	1495		5	D	Mid Slope	Poorly		Clayey		0-40	Moder			<20%	ESSFmv2	04		7		30
WHR_MurrayR	G	310, 318, 319, 320, 321, 322	21-Oct-10	CM/SA	290		10	6096701	619458	Flat	1600	0			Crest	Rapidly									ESSFmv2	02		1		0
WHR_MurrayR	V	309, 338, 339	21-Oct-10	CM/SA	291	76-wetland	10	6096607	619387						Depression										ESSFmv2	02		7		
WHR_MurrayR	G	333, 334, 335, 336, 337	21-Oct-10	CM/SA	292		10	6096686	619521	ENE	1598	50	1	B	Crest	Well		Silty		0-40	Mor	30	L	35-70%	ESSFmv2	02		7		0
WHR_MurrayR	V	340, 341	21-Oct-10	CM/SA	293		10	6096977	619623																ESSFmv2	02				
WHR_MurrayR	V	342, 343	21-Oct-10	CM/SA	294	Heli119	10	6096554	620775	S	1463	35			Crest, Mid Slope										ESSFmv2	01		7		
WHR_MurrayR	V	344, 345	21-Oct-10	CM/SA	295	Heli118	10	6096182	621870	SE		2			Toe, Depression										ESSFmv2	04		7		
WHR_MurrayR	V	346, 347, 348	21-Oct-10	CM/SA	296	Heli73	10	6097802	619748	SE		15													ESSFmv2	04		6		
WHR_MurrayR	V	349, 350, 351, 352	21-Oct-10	CM/SA	297	Heli71	10	6098771	619144	Flat	1280	0			Level	Very Poorly									ESSFmv2	04		6		5
WHR_MurrayR	V	353, 354	21-Oct-10	CM/SA	298	Heli69	10	6098643	620202		1310				Level										BWBSmw1	01		7		
WHR_MurrayR	V	355, 356	21-Oct-10	CM/SA	299	Heli67	10	6098467	621496		1189														ESSFmv2	02		6		
WHR_MurrayR	G	359 - 368	21-Oct-10	CM/SA	300		10	6098600	620616	Flat	1244	0	4	C	Level	Mod. Well		Clayey		0-40	Mor		N	<20%	ESSFmv2	01		6		45
WHR_MurrayR	V	369, 370, 371	21-Oct-10	CM/SA	301	Heli92	10	6102416	619393	NW	1280	40													BWBSwk1	01		6		
WHR_MurrayR	V	372, 373, 374	21-Oct-10	CM/SA	302	Heli93	10	6103031	618132	SW		50													ESSFmv2	35		6		
WHR_MurrayR	V	375, 376	21-Oct-10	CM/SA	303	Heli91	10	6102461	617888	Flat	1280	0			Lower Slope										ESSFmv2	01		6		40
WHR_MurrayR	V	377, 378, 379	21-Oct-10	CM/SA	304	Heli90	10	6102397	617041																BWBSwk1	01		6		
WHR_MurrayR	G	380, 381, 382, 383, 384, 385	21-Oct-10	CM/SA	305	Heli82	10	6103852	616171	NE	1137	4	4	B	Level	Well		Clayey		0-40	Mor			35-70%	ESSFmv2	01		6		45
WHR_MurrayR	V	388, 389, 390	21-Oct-10	CM/SA	306	Heli83	10	6102798	614701	S	1326	25			Mid Slope										BWBSmw1	03		6		
WHR_MurrayR	G	391, 392	21-Oct-10	CM/SA	307	Heli85	10	6102573	614032	N	1287	35	2	B	Crest	Rapidly		Silty		0-40		10	L		ESSFmv2	02		6		55
WHR_MurrayR	V	393, 394	21-Oct-10	CM/SA	308	Heli89	10	6101670	614041	NW		25			Crest										ESSFmv2	01		6		25
WHR_MurrayR	V	395, 396	21-Oct-10	CM/SA	309	Heli86	10	6101479	613603	NW		25			Crest										BWBSmw1	06		6		50
WHR_MurrayR	V	397, 398	21-Oct-10	CM/SA	310	Heli84	10	6102965	613317	W	1402	45													BWBSmw1	01		6		
WHR_MurrayR	G	1, 2, 3, 4	22-Oct-10	CM/SA	311	Rescan40	10	6097185	625948	Flat	759	0	6	C	Level	Well		Loamy		0-40	Moder			<20%	BWBSmw1	07		7		18
WHR_MurrayR	G		22-Oct-10	CM/SA	312		10	6093798	623761	Flat	788	0													SBSwk2	02		1		0
WHR_MurrayR	G	6, 7, 8, 9, 10	22-Oct-10	CM/SA	313	Road100	10	6093946	623708	Flat	788	0	2	B	Level	Well		Loamy		0-40	Mor			35-70%	BWBSmw1	02		6		35
WHR_MurrayR	G	11, 12, 13, 14, 15	22-Oct-10	CM/SA	314	Road4	10	6098136	619052	SE	780	48	2	B	Mid Slope	Well		Loamy		0-40	Moder			>70%	BWBSmw1	02		5		38
WHR_MurrayR	G	16, 17, 18, 19, 20	22-Oct-10	CM/SA	315	Near Road 9	10	6095425	625050	Flat	783	0	3	C	Level	Well		Silty		0-40	Moder			>70%	BWBSmw1	03		6		20
WHR_MurrayR	G	21, 22, 23, 24, 25	22-Oct-10	CM/SA	316	Near Road002	10	6096753	625178	ENE	768	45	3	C	Mid Slope	Well		Silty		0-40	Mor			<20%	BWBSmw1	03		7		25
WHR_MurrayR	G	26, 27, 28, 29, 30	22-Oct-10	CM/SA	317		10	6099311	621893	Flat	1069	1													ESSFmv2	04	b	3		0
WHR_MurrayR	G	31, 32, 33, 34, 35	22-Oct-10	CM/SA	318	Near Rescan62	10	6099353	621840	N	1081	20	4	B	Lower Slope	Mod. Well		Clayey		0-40	Mor		N	20-35%	ESSFmv2	04	m	7		40
WHR_MurrayR	V	36, 37, 38, 39, 40	22-Oct-10	CM/SA	319	Near road042	10	6098883	622795		1044				Level										BWBSwk1	03	b	3		0
WHR_MurrayR	G	41, 42, 43, 44, 45	22-Oct-10	CM/SA	320		10	6098861	626332	Flat	764	0	6	D	Level	Imperfectly		Silty		0-40	Moder			<20%	BWBSmw1	07		6		30
WHR_MurrayR	G	46, 47, 48, 49, 50, 51	22-Oct-10	CM/SA	321		10	6100690	626561	Flat	757	0	6	D	Level	Imperfectly		Silty		0-40	Moder			<20%	BWBSmw1	07	cm	5		15
WHR_MurrayR	G	52, 53	23-Oct-10	CM/SA	322	VRI-5	10	6113327	631753	ENE	941	5	5	B	Lower Slope	Mod. Well		Silty		0-40	Moder		N	<20%	BWBSwk1	03		4		15
WHR_MurrayR	G		23-Oct-10	CM/SA	323	VRI-6	10	6112085	632351	N	985	5	6	D	Lower Slope	Imperfectly		Silty		>40	Moder		N	<20%	BWBSwk1	06		5		25
WHR_MurrayR	G	54, 55, 56, 57, 58, 59	23-Oct-10	CM/SA	324		10	6114143	631248	N	935	40	2	B	Crest	Well		Silty		0-40	Mor		N	20-35%	BWBSwk1	03	tC	6		25
WHR_MurrayR	G	60, 61, 62, 63, 64	23-Oct-10	CM/SA	325	near road88	10	6111802	623403	NW	787	5	5	B	Toe	Well		Loamy		0-40	Mor		N	<20%	BWBSmw1	06	mix(C,D)m*	5		50
WHR_MurrayR	G	65, 66, 67, 68, 69	23-Oct-10	CM/SA	326	near road68	10	6113526	621950	NW	887	5	5	B	Toe	Mod. Well		Silty		0-40	Mor		N	20-35%	BWBSmw1	04	Ct	6		20
WHR_MurrayR	G	38, 39, 40, 41, 42	11-Jul-11	BR/RM/CM/SA/RD	501	Road 007	10	6111083	628558	WNW	878	6	4	C	Mid Slope	Mod. Well		Loamy		0-40	Moder			20-35%	BWBSmw	110		6		50
WHR_MurrayR	G	43, 44, 45, 46, 47	12-Jul-11	BR/CM/RM/SA/JSJ/RD	502	Heli025	10	6100013	640774	SW	1278	27	1	C	Upper Slope	Well		Loamy		0-40	Moder			35-70%	BWBSwk1	103		5		40
WHR_MurrayR	G	48, 49 ,50 ,51, 52	12-Jul-11	BR/CM/RM/SA/JSJ/RD	503	No planned site #	10	6099997	640820						Mid Slope										BWBSwk1	103$				
WHR_MurrayR	G	53, 54, 55, 56, 57	12-Jul-11	RM/CM/SA/JSJ/RD	504	Heli015	10	6104207	648001	Very low slope - SW	1063	2	5	C	Level	Imperfectly		Loamy		0-40	Moder			<20%	BWBSwk1	104		5		30
WHR_MurrayR	G	58, 59 ,60, 61, 62	12-Jul-11	SA/JSJ/CM/RM/RD	505	Heli027	10	6099904	648349	NE	1066	35	5	C	Mid Slope	Imperfectly		Loamy		0-40	Moder			<20%	BWBSwk1	110		5		50
WHR_MurrayR	G	63, 64, 65, 66, 67	12-Jul-11	CM/RM/SA/JSJ/RD	506	No planned site #	10	6099997	648437		1058	0								>40										
WHR_MurrayR	G	70, 71, 72, 73, 74	12-Jul-11	RM/CM/JSJ/SA/RD	507	Road037	10	6099404	643275	N	1287	54	3	C	Mid Slope	Mod. Well		Loamy		0-40	Moder			35-70%	ESSFmv2	101	s	6		55
WHR_MurrayR	G	75, 76, 77, 78, 79	13-Jul-11	RM/CM/JSJ/SA/RD	508	Heli013	10	6103947	636483		864	0	5	D	Level (floodplain)	Rapidly		Sandy		0-40	Mull			<20%	BWBSmw	112$	b	3		80
WHR_MurrayR	G	80, 81, 82, 83, 84	13-Jul-11	RM/CM/JSJ/SA/RD	509	Heli008	10	6107743	643035	W	960	5	5	C	Mid Slope	Imperfectly		Loamy		0-40	Moder			<20%	BWBSmw	104		5		30
WHR_MurrayR	G	85, 86, 87, 88, 89	13-Jul-11	SA/JSJ/RD	510	Heli004	10	6111780	638607	Flat	1154	0	5	C	Level	Poorly		Loamy		0-40	Moder			<20%	ESSFmv2	3		5		25
WHR_MurrayR	G	90, 91, 92, 93, 94	13-Jul-11	SA/JSJ/RD	511	Heli005	10	6112583	642588	SW	1119	18	5	C	Mid Slope	Well		Loamy			Moder			35-70%	BWBSwk1	104		5		
WHR_MurrayR	G	98, 99, 100, 101, 102	14-Jul-11	SA/JSJ/RD	512	Heli044	10	6088176	639308	Flat	1258	0	3	B	Crest	Mod. Well		Loamy			Moder			35-70%	ESSFmv2	3		5		25
WHR_MurrayR	G	111, 112, 113, 114, 115	14-Jul-11	SA/JSJ/RD	513	Heli68172	10	6079254	631320	Flat	1690	0			Crest	Rapidly		Loamy			Mull						b	3		0
WHR_MurrayR	G	22, 23, 24, 25, 26	14-Jul-11	SA/JSJ/RD	514	Heli071	10	6079613	626899	S	1618	6	5	C	Level	Imperfectly		Loamy			Mull			<20%			b	3		0
WHR_MurrayR	G	27, 28, 29, 30, 31	14-Jul-11	SA/JSJ/RD	515	Heli082	10	6079086	618857	E	1103	20	5	C	Mid Slope	Mod. Well		Loamy			Moder				ESSFmv2	4		6		50
WHR_MurrayR	G	32, 33, 34, 35, 36	14-Jul-11	SA/JSJ/RD	516	Heli087	10	6079604	608238	E	1410	25	4	C	Mid Slope	Mod. Well		Loamy			Moder			35-70%	ESSFwc3	3		6		35
WHR_MurrayR	G	38, 39, 40, 41, 42	15-Jul-11	SA/JSJ	517	Heli035	10	6093600	642548	Flat	945		2	B	Level	Rapidly		Loamy		0-40	Moder			>70%	BWBSwk1	102		6		25
WHR_MurrayR	G	43, 44, 45, 46, 47	15-Jul-11	SA/JSJ	518	No planned site #	10	6093312	642432	N	956	5	5	D	Lower Slope	Imperfectly		Clayey		0-40	Moder			<20%	BWBSmw	111		6		50
WHR_MurrayR	G	48, 49, 50, 51, 52	15-Jul-11	SA/JSJ	519	Heli038	10	6091950	650815	Flat	1197	0	5	B	Level	Imperfectly		Loamy		0-40	Moder			35-70%	ESSFmv2	3		5		35
WHR_MurrayR	G	53, 54, 55, 56, 57	15-Jul-11	SA/JSJ	520	B/w heli052 and "55"	10	6080532	643969	E	1098	15	5	C	Mid Slope	Poorly		Loamy		0-40	Moder			20-35%	BWBSwk1	110$6B.1		5		55
WHR_MurrayR	G	58, 59, 60, 61, 62	16-Jul-11	SA/JSJ	521	Near heli053	10	6080100	646518	Very slight - SSE	982	5	2	B	Level	Rapidly		Sandy		0-40	Moder			>70%	BWBSmw	102		5		20
WHR_MurrayR	G	63, 64, 65, 66, 67	16-Jul-11	SA/JSJ	522	No planned site #	10	6081017	649088	Very slight - NW	1030	3	7	C	Level		Aquic		Mesic	>40	Mor			<20%	BWBSwk1	wb09		5		40
WHR_MurrayR	G	68, 69, 70, 71, 72	16-Jul-11	SA/JSJ	523	Near Road050	10	6089832	643249	Very slight - NE	1014	2		D	Level	Poorly		Sandy and Loamy			Moder			<20%	BWBSwk1	110		6		55
WHR_MurrayR	G	73, 74, 75, 76, 77	16-Jul-11	SA/JSJ	524	Near Road052	10	6089035	632138	SSE	1323	8	5	C	Mid Slope	Imperfectly		Loamy		0-40	Moder			35-70%	ESSFmv2	4		4		25
WHR_MurrayR	G	78, 79, 80, 81, 82	17-Jul-11	SA/JSJ	525	No planned site # / Near Road003	10	6116708	638692	SW	1220	5	5	E	Mid Slope	Imperfectly		Loamy		0-40	Moder			<20%	ESSFmv2		a	3		
WHR_MurrayR	G	83, 84, 85, 86, 87	17-Jul-11	SA/JSJ	526	No planned site #	10	6112187	634294	Very slight - E	1156	3	5	B	Level	Mod. Well		Loamy		0-40	Mor			<20%	ESSFmv2 or BWBSwk1			4		60
WHR_MurrayR	G	88, 89, 90, 91, 92	17-Jul-11	SA/JSJ	527	Near Road001	10	6118047		Flat	990	0	2	C	Crest	Well		Loamy		0-40	Moder			>70%	BWBSmw	103		6		10
WHR_MurrayR	G	93, 94, 95, 96, 97	17-Jul-11	SA/JSJ	528		10	6108655	633734	E	1070	13	4	C	Mid Slope	Mod. Well		Silty		>40	Moder			<20%	BWBSwk1	101		7		30
WHR_MurrayR	G	98, 99, 100, 101, 102	18-Jul-11	SA/JSJ	529	No planned site #	10	6110765	598794	N	1455	25	4	C	Mid Slope	Well		Silty		0-40	Moder			35-70%	ESSFmv2	1				15
WHR_MurrayR	G	104, 105, 106, 107	18-Jul-11	SA/JSJ	530	No planned site #	10	6100700	609397		853		5	C	Level	Well		Loamy		0-40	Moder			35-70%	SBSwk2	1		7		60
WHR_MurrayR	G	108, 109, 110, 111, 112	18-Jul-11	SA/JSJ	531	No planned site #	10	6105449	627382		869														BWBSmw	cutblock	a	3		
WHR_MurrayR	G	113, 114, 115, 116, 117	18-Jul-11	SA/JSJ	532	No planned site #	10	6109663	626365	N	773	13	5	C	Lower Slope	Well		Sandy		0-40	Moder			<20%	BWBSmw	101$6.B.1		6		40

Project_ID	Date	Plot_No	Surveyors	N_hab_feature_type	N_hab_feature_dst (m)	M_RATA_LI_W	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	M_RATA_LI_G	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	M_RATA_RB	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	B_BTNW_RE	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	M_ORAM_LI_W	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.
WHR_MurrayR	18/10/2010	201	CM/SA	RT	100	5	RP	1	0.1	ST	7		6	RR	1	5	ST	6		6							M							6						
WHR_MurrayR	18/10/2010	204	CM/SA	RT	60	6							6							6							N							6						
WHR_MurrayR	19/10/2010	205	CM/SA			3							4							3							N						1	2	RD	1	0.5	ST	1	
WHR_MurrayR	19/10/2010	207	CM/SA			6							4							5							N							5						
WHR_MurrayR	19/10/2010	211	CM/SA			1						1	2							5							N							5						
WHR_MurrayR	19/10/2010	212	CM/SA			3							5							6							M							6						
WHR_MurrayR	19/10/2010	213	CM/SA			2	OT	1	0.05	FD/ST	1	1	2							2							N							5						
WHR_MurrayR	19/10/2010	214	CM/SA			2						2	1							4							N							6						
WHR_MurrayR	19/10/2010	220	CM/SA			4							4							6							N							6						
WHR_MurrayR	19/10/2010	222	CM/SA			5							6							6							L							6						
WHR_MurrayR	20/10/2010	223	CM/SA			5							5							6							M							6						
WHR_MurrayR	20/10/2010	229	CM/SA			5							3							6							N							6						
WHR_MurrayR	20/10/2010	230	CM/SA			5							4							6							N							6						
WHR_MurrayR	20/10/2010	234	CM/SA			4	RD	1	0.03	ST	2	1	3							6							M	OT1	2	0.03	FD	2	2	6						
WHR_MurrayR	20/10/2010	235	CM/SA			5							4							6							M							4						
WHR_MurrayR	20/10/2010	248	CM/SA			6							4							6							N							6						
WHR_MurrayR	20/10/2010	253	CM/SA			5							4							6							N							6						
WHR_MurrayR	20/10/2010	256	CM/SA			3							3							6							L							6						
WHR_MurrayR	21/10/2010	270	CM/SA			3							1							2							N							3						
WHR_MurrayR	21/10/2010	271	CM/SA			2							2							5							N							5						
WHR_MurrayR	21/10/2010	279	CM/SA			3							2							6							N							5						
WHR_MurrayR	21/10/2010	289	CM/SA			3							3							2							L		2					3	OT	1	0.05	FD	1	
WHR_MurrayR	21/10/2010	290	CM/SA			1							2							1	OT1	1	0.01	ST	1	1	N							1	RD		0.01	ST		
WHR_MurrayR	21/10/2010	292	CM/SA			1							2							1							N							2						
WHR_MurrayR	21/10/2010	300	CM/SA			3							1	OT	2	0.5	FD	1	1	6							N							6						
WHR_MurrayR	21/10/2010	305	CM/SA			4							3							6							N							6						
WHR_MurrayR	21/10/2010	307	CM/SA			3							2							5							N							3						
WHR_MurrayR	22/10/2010	311	CM/SA			6							6							6							M							6						
WHR_MurrayR	22/10/2010	312	CM/SA			6							6							6							N							6						
WHR_MurrayR	22/10/2010	313	CM/SA			6							5							6							L							6						
WHR_MurrayR	22/10/2010	314	CM/SA			6							6							6							L							6						
WHR_MurrayR	22/10/2010	315	CM/SA			6							6							6							L							6						
WHR_MurrayR	22/10/2010	316	CM/SA			6							6							6							M							6						
WHR_MurrayR	22/10/2010	317	CM/SA			6							6							6							N							6						
WHR_MurrayR	22/10/2010	318	CM/SA			5							3							6							N							6						
WHR_MurrayR	23/10/2010	322	CM/SA			6							4							6							N							6						
WHR_MurrayR	22/10/2010	320	CM/SA			6							6							6							M							6						
WHR_MurrayR	22/10/2010	321	CM/SA			6							6							6							H							6						
WHR_MurrayR	23/10/2010	323	CM/SA			6							6							6							M							6						
WHR_MurrayR	23/10/2010	324	CM/SA			6							5							6							L							6						
WHR_MurrayR	23/10/2010	325	CM/SA			6							6							6							H							6						
WHR_MurrayR	23/10/2010	326	CM/SA			4	OT					1	4							6							L							6						
WHR_MurrayR	12/07/2011	504	RM/CM/SA/JSJ/RD			5							3						3	6							N													
WHR_MurrayR	12/07/2011	505	CM/RM/JSJ/SA/RD			3						1	4							4							L													
WHR_MurrayR	12/07/2011	506	CM/RM/JSJ/RD/SA			6						1	4						2	5						3	L													
WHR_MurrayR	12/07/2011	507	CM/SA/JSJ/RM/RD			4							5							6							N													
WHR_MurrayR	13/07/2011	508	CM/RM/JSJ/SA/RD			5							5							5							M						1							
WHR_MurrayR	13/07/2011	509	RM/CM/JSJ/SA/RD			5						1	5							5							N													
WHR_MurrayR	13/07/2011	510	SA/JSJ/RD			4						1	3						2	5							N													
WHR_MurrayR	13/07/2011	511	SA/JSJ/RD			5							4							6							N													
WHR_MurrayR	14/07/2011	512	SA/JSJ/RD			4							4							5							N													
WHR_MurrayR	14/07/2011	513	SA/JSJ/RD			2							1							2							N													
WHR_MurrayR	14/07/2011	514	SA/JSJ/RD			5						1	3							3						2	N													
WHR_MurrayR	14/07/2011	515	SA/JSJ/RD			2						1	4							3							L						2							
WHR_MurrayR	14/07/2011	516	SA/JSJ/RD			3						1	5							5							N						2							
WHR_MurrayR	15/07/2011	517	SA/JSJ			3						1	2							4							N						2							
WHR_MurrayR	15/07/2011	518	SA/JSJ			3						1	4						2	3						3	M						4							
WHR_MurrayR	15/07/2011	519	SA/JSJ			3						1	4						2	5							N													
WHR_MurrayR	15/07/2011	520	SA/JSJ			6							5							6							N						1							
WHR_MurrayR	16/07/2011	521	SA/JSJ			3						1	3						2	5							N													
WHR_MurrayR	16/07/2011	522	SA/JSJ			5						1	5						2	6							N													
WHR_MurrayR	16/07/2011	523	SA/JSJ			4						1	5							5							M													
WHR_MurrayR	16/07/2011	524	SA/JSJ			6						1	4						2	5						3	L						4							
WHR_MurrayR	17/07/2011	525	SA/JSJ			6						1	4						2	5						3	N						4							
WHR_MurrayR	17/07/2011	526	SA/JSJ			5						1	5						2	6						3	N						4							
WHR_MurrayR	17/07/2011	527	SA/JSJ			5						1	3						2	5						3	M						4							
WHR_MurrayR	17/07/2011	528	SA/JSJ			2						1	3						2	3						3	L						4							
WHR_MurrayR	18/07/2011	529	SA/JSJ			2						1	2						2	2						3	N						4							
WHR_MurrayR	18/07/2011	530	SA/JSJ			5						1	5						2	6						3	M						4							
WHR_MurrayR	18/07/2011	531	SA/JSJ			6						1	5						2	6						3	N						4							
WHR_MurrayR	18/07/2011	532	SA/JSJ			5						1	5						2	6						3	H						4							

Hab. Feature	Conf.	Distance	F/C L.R	Imp.	Com.	**M_ORAM_LI_G**	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	Hab. Feature	Conf.	Distance	F/C L.R	Imp.	Com.	**M_ALAL_LI_W**	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	Hab. Feature	Conf.	Distance	F/C L.R	Imp.	Com.	**M_ALAL_LI_G**	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	**M_URAR_LI_P**	Hab_feature	Conf	Distance(km)	FCLR
						6													4													5							6				
						6													3													4							6				
					2	2													6													6							5				
						5													6													3							5				
					2	4													6													5							6				
						6													1													2							3				
						5													6	OT	1	0.05	FD/ST	1							1	3							3				
					1	6													3													6							4				
						5													6													2							6				
						6													1													2							5				
						6													1	RI	1	0.2	FD	1								1							2				
						5													6													5							5				
						5													6													5							5				
						3	RD	1	0.03	ST	2								1	RD	1					OT2	1	0.03	FD	2	3	1							4				
						2													2													2							2				
						6													4													2							5				
						6													5													4							6				
						5													4													4							6				
						3													6													2							5				
					1	5													6													5							5				
						4													4													3							5				
RI	1	0.2	ST	1		2	OT	1	0.05	FD	1		RI	1	0.2	ST	1		6													3							3				
					2	1													6													5							5	OT2			
						2													6													5							4				
						6													4	OT	1	0.75	FD	1	2							3							5				
						6													5													3							5				
					1	2													5													3							5				
						6													1													1	OT	1	0.02	FD	1	2	4				
						6													5												1	5							6				
						6													3													3							5				
						6													1													1							4				
						6													1	RI	2										1	2							6				
						6													2													2							3	RP	1	0.05	ST
						6													3	OT1											1	1							6				
						6													5													4							6				
						6													2													1							5				
						6													1													1							3				
						6													1													2						1	4				
						6													2													1							5				
						6													5													4							5				
						6													5													5							6				
						6													4													4							5				
																			4													3						1	5				
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																			3						5							4						6	5				
																			5						5							3						6	5				
																			2						5							2						6	4				
																			3						5							1						6	3				
																			1						5							1						6	4				

Imp.	Com.	M_URAR_LI_S	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	M_URAR_LI_F	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	M_URAR_HI	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	M-MAPE_LI_A	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.	M_MAPE_BI	Hab_feature	Conf	Distance(km)	FCLR	Imp.	Com.
		6							5	RP	1	0.1	ST	7		6							5													6						
		6							6							6							4													6						
		2							6							2							6													6						
		2							5							2							4													6						
		4						3	4							2							3													4						
		2							3							6							1													2						
		2	OT	1	0.05	FD/ST	1	2	4							4							6													6						
		1							3							5							6													6						
		5							5							3							4													6						
		3							3							6							3													3						
		2							3						1	6							1													2						
		5							4							5							4													6						
		5							3							5							3													6						
		4							3							6							2													2						
		2							2							5							4													6						
		4							3							6							3													3						
		6							4							6							5													6						
		5							5							6							2													3						
		2							4							6							6													6						
		6							4							5							3													2						
		5							2							6							5													6						
		2	OT	1	0.05			1	4							3							3													2	RI	1	0.05	ST	1	2
	3	6							6							1	RD					4	6													6						
		5							5							1							6													6						
		3							3	OT	1	0.75	FD	1	2	5							2													4						
		5							4							6							4													5						
		3							3							4	OT		1.5	ST	4	2	5													6						
		2	RP	1	0.05	ST	6		3	RP	1	0.05	ST	6		6							1													1						
		6							6							6							6													6						
		4							3							6							3													5						
		3							2							6							4													5						
		5	RP	1	0.05	ST	6	2	5	RP	1	0.05	ST	6	2	6							3													6						
6		3							3							6							3													2						
		3							5							6							2	OT2	1	0.05	ST	2		OT3	1	0	FD	1	2	6						
		5							2							6							1	OT	1	0.02	FD	1							1	3						
		4							2							6							2													6						
		3							4							6							1	RI	1	0.5	FD	1							1	1						
		3							5							6							4												2	4						
		2							3	OT		0.1	FD			6							2													2						
		5							3							6							2													3						
		5							5							6							4													4						
		5							4							6							4													5						
	2	4							4							6							4													6						
		4							4							4							3													5						
	6	2						7	3						8	6						9	5						10							6						11
	5	5							4						3	3							5						4							6						
		1						2	3							6							2						3							6						4
		4						3	4						4	5							3						5							6						
		4						4	3							5						5	4													6						
		4							3							5						2	4						3							6						
	2	3							1						3	5						4	4						5							6						
	1	2							3							2							6													6						
	4	2							4						5	2							5													6						
		5							3						4	2						5	2													4						6
	5	3						6	4						7	2						8	3						9							4						10
	3	4							2						4	5						5	3						6							5						7
	6	3						7	4						8	4						9	2						10							3						11
	5	4							4						6	5							4						7							6						
		3						4	4						5	5							4						6							5						7
	5	2						6	2						7	5						8	4						9							6						10
	5	2						6	5						7	6						8	5						9							6						
		2						3	4						4	5						5	2						6							2						7
		3						7	1						8	4						9	3						10							5						11
	7	2						8	3						9	5						10	5						11							6						12
	7	5						8	4						9	5						10	5						11							6						12
	7	2						8	3						9	3						10	3													4						11
	7	5						8	4						9	2						10	3						11							4						12
	7	1						8	4						9	1						10	5						11							6						12
	7	3						8	3						9	5						10	1						11							2						12
	7	3						8	2						9	6						10	6						11							6						12
	7	4						8	3						9	5						10	2						11							2						12

APPENDIX D FINAL WILDLIFE HABITAT RATINGS TABLES

BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
BAFA	/	/	BA	1	BAFAun/00/BA/1	5	5	1	5	5	1	N	4	6	6	6	5	6	2	6	6
BAFA	/	/	FM	2	BAFAun/00/FM/2	4	4	2	5	4	2	N	4	6	3	5	1	1	3	6	6
BAFA	/	/	HE	2	BAFAun/00/HE/2	2	2	1	5	2	1	N	4	6	3	5	2	2	1	6	6
BAFA	/	/	HE	3	BAFAun/00/HE/3	2	2	1	5	2	1	N	4	6	3	5	2	2	1	6	6
BAFA	/	/	HE	4	BAFAun/00/HE/4	2	2	1	5	2	1	N	4	6	4	5	2	2	1	6	6
BAFA	/	/	HE	5	BAFAun/00/HE/5	2	2	1	5	2	1	N	4	6	4	5	2	2	1	6	6
BAFA	/	/	HE	6	BAFAun/00/HE/6	2	2	1	5	2	1	N	4	6	4	5	2	2	1	6	6
BAFA	/	/	HE	7	BAFAun/00/HE/7	2	2	1	5	2	1	N	4	6	4	5	2	2	1	6	6
BAFA	/	/	KR	2	BAFAun/00/KR/2	1	1	1	5	1	1	N	4	6	5	5	3	4	1	6	6
BAFA	/	/	KR	3	BAFAun/00/KR/3	1	1	1	5	1	1	N	4	6	5	5	3	4	1	6	6
BAFA	/	/	KR	4	BAFAun/00/KR/4	1	1	1	5	1	1	N	4	6	5	5	3	4	1	6	6
BAFA	/	/	KR	5	BAFAun/00/KR/5	1	1	1	5	1	1	N	4	6	5	5	3	4	1	6	6
BAFA	/	/	KR	6	BAFAun/00/KR/6	1	1	1	5	1	1	N	4	6	5	5	3	4	1	6	6
BAFA	/	/	KR	7	BAFAun/00/KR/7	1	1	1	5	1	1	N	4	6	5	5	3	4	1	6	6
BAFA	/	/	LA	/	BAFAun/00/LA	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
BAFA	/	/	WE	2	BAFAun/00/WE/2	3	3	2	5	3	2	N	4	6	3	5	2	2	5	6	6
BWBS	mw	/	BA	1	BWBSmw/00/BA/1	5	5	6	5	5	6	N	4	6	6	6	6	6	5	6	6
BWBS	mw	/	LA	/	BWBSmw/00/LA	6	6	6	6	6	6	N	4	6	4	6	6	6	6	6	6
BWBS	mw	/	MA	2	BWBSmw/00/MA/2	5	5	6	4	4	6	N	4	5	3	3	4	4	5	5	6
BWBS	mw	/	RI	/	BWBSmw/00/RI	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
BWBS	mw	/	SA	2	BWBSmw/00/SA/2	5	5	6	4	4	6	N	4	4	2	3	4	4	5	5	6
BWBS	mw	/	SA	3	BWBSmw/00/SA/3	5	5	6	4	4	6	N	4	1	1	3	4	4	5	4	6
BWBS	mw	/	WA	/	BWBSmw/00/WA	6	6	6	6	6	6	N	4	6	4	6	6	6	6	6	6
BWBS	mw	/	WB	2	BWBSmw/00/WB/2	5	5	6	2	2	6	N	4	5	3	3	4	4	5	5	6
BWBS	mw	/	WB	3	BWBSmw/00/WB/3	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	mw	/	WB	4	BWBSmw/00/WB/4	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	mw	/	WB	5	BWBSmw/00/WB/5	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	mw	/	WB	6	BWBSmw/00/WB/6	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	mw	/	WB	7	BWBSmw/00/WB/7	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	mw	/	WE	2	BWBSmw/00/WE/2	5	5	6	3	3	6	N	4	5	2	3	4	3	5	5	6
BWBS	mw	/	WE	3	BWBSmw/00/WE/3	5	5	6	3	3	6	N	4	1	1	3	4	3	5	5	6
BWBS	mw	/	WF	2	BWBSmw/00/WF/2	5	5	6	4	4	6	N	4	5	4	3	3	6	5	5	6
BWBS	mw	/	WF	3	BWBSmw/00/WF/3	5	5	6	4	4	6	N	4	3	3	3	3	4	5	5	6
BWBS	mw	/	WF	4	BWBSmw/00/WF/4	5	5	6	4	4	6	N	4	4	4	3	3	4	5	5	6
BWBS	mw	/	WF	5	BWBSmw/00/WF/5	5	5	6	4	4	6	N	4	4	4	3	3	4	5	5	6
BWBS	mw	/	WF	6	BWBSmw/00/WF/6	5	5	6	4	4	6	N	4	4	4	3	3	4	5	5	6
BWBS	mw	/	WF	7	BWBSmw/00/WF/7	5	5	6	4	4	6	N	4	4	4	3	3	4	5	5	6
BWBS	mw	/	WH	2	BWBSmw/00/WH/2	5	5	6	5	5	6	N	4	5	2	2	4	4	5	5	6
BWBS	mw	/	WS	2	BWBSmw/00/WS/2	5	5	6	4	4	6	N	4	4	2	4	4	4	5	5	6
BWBS	mw	/	WS	3	BWBSmw/00/WS/3	5	5	6	4	4	6	N	4	1	1	4	4	4	5	4	6
BWBS	mw	/	WS	4	BWBSmw/00/WS/4	5	5	6	4	4	6	N	4	1	1	4	4	4	5	3	6
BWBS	mw	/	WS	5	BWBSmw/00/WS/5	5	5	6	4	4	6	L	3	2	2	4	4	4	5	2	5
BWBS	mw	/	WS	6	BWBSmw/00/WS/6	5	5	6	4	4	6	L	3	2	2	4	4	4	5	2	5
BWBS	mw	/	WS	7	BWBSmw/00/WS/7	5	5	6	4	4	6	L	3	2	2	4	4	4	5	2	4
BWBS	mw	/	101$	2	BWBSmw/101$/2	5	5	6	5	5	6	N	4	4	4	2	3	5	5	5	6
BWBS	mw	/	101$	3	BWBSmw/101$/3	5	5	6	5	5	6	N	4	2	2	2	3	4	5	5	6
BWBS	mw	/	101$	4	BWBSmw/101$/4	5	5	6	5	5	6	N	4	2	2	4	4	5	5	4	6
BWBS	mw	/	101$	5	BWBSmw/101$/5	5	5	6	5	5	6	M	2	3	3	4	4	5	5	3	5
BWBS	mw	/	101$	6	BWBSmw/101$/6	5	5	6	5	5	6	M	2	3	3	4	4	5	5	2	4
BWBS	mw	/	101$	7	BWBSmw/101$/7	5	5	6	5	5	6	M	2	3	3	4	4	5	5	2	4
BWBS	mw	/	101	2	BWBSmw/101/2	5	5	6	5	5	6	N	4	5	4	3	3	5	5	5	6
BWBS	mw	/	101	3	BWBSmw/101/3	5	5	6	5	5	6	N	4	3	3	3	3	3	5	5	6
BWBS	mw	/	101	4	BWBSmw/101/4	5	5	6	4	4	6	N	4	4	4	4	4	4	5	4	6

BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
BWBS	mw	/	101	5	BWBSmw/101/5	5	5	6	3	3	6	M	2	4	4	4	4	4	5	3	4
BWBS	mw	/	101	6	BWBSmw/101/6	5	5	6	3	3	6	H	1	5	4	4	4	4	5	2	3
BWBS	mw	/	101	7	BWBSmw/101/7	5	5	6	3	3	6	H	1	5	4	4	4	4	5	2	3
BWBS	mw	/	102$	2	BWBSmw/102$/2	5	5	6	5	5	6	N	4	4	4	3	4	4	5	5	6
BWBS	mw	/	102$	3	BWBSmw/102$/3	5	5	6	5	5	6	N	4	2	2	3	4	2	5	5	6
BWBS	mw	/	102$	4	BWBSmw/102$/4	5	5	6	5	5	6	N	4	3	4	4	5	3	5	5	6
BWBS	mw	/	102$	5	BWBSmw/102$/5	5	5	6	5	5	6	N	4	4	4	4	5	3	5	4	5
BWBS	mw	/	102$	6	BWBSmw/102$/6	5	5	6	5	5	6	N	4	4	4	4	5	3	5	4	5
BWBS	mw	/	102$	7	BWBSmw/102$/7	5	5	6	5	5	6	N	4	4	4	4	5	3	5	4	5
BWBS	mw	/	102	2	BWBSmw/102/2	5	5	6	5	5	6	N	4	5	4	2	3	5	5	5	6
BWBS	mw	/	102	3	BWBSmw/102/3	5	5	6	5	5	6	N	4	4	4	2	3	4	5	5	6
BWBS	mw	/	102	4	BWBSmw/102/4	5	5	6	2	2	6	N	4	5	5	4	4	5	5	4	6
BWBS	mw	/	102	5	BWBSmw/102/5	5	5	6	1	1	6	N	4	5	5	4	4	5	5	4	5
BWBS	mw	/	102	6	BWBSmw/102/6	5	5	6	1	1	6	N	4	5	5	4	4	5	5	3	5
BWBS	mw	/	102	7	BWBSmw/102/7	5	5	6	1	1	6	N	4	5	5	4	4	5	5	3	5
BWBS	mw	/	103$/102$	2	BWBSmw/103$/102$/2	5	5	6	5	5	6	N	4	4	4	2	3	4	5	5	6
BWBS	mw	/	103$/102$	3	BWBSmw/103$/102$/3	5	5	6	5	5	6	N	4	2	2	2	3	2	5	5	6
BWBS	mw	/	103$/102$	4	BWBSmw/103$/102$/4	5	5	6	5	5	6	N	4	3	4	3	4	3	5	5	6
BWBS	mw	/	103$/102$	5	BWBSmw/103$/102$/5	5	5	6	5	5	6	L	3	4	4	3	4	3	5	4	5
BWBS	mw	/	103$/102$	6	BWBSmw/103$/102$/6	5	5	6	5	5	6	L	3	4	4	3	4	3	5	4	5
BWBS	mw	/	103$/102$	7	BWBSmw/103$/102$/7	5	5	6	5	5	6	L	3	4	4	3	4	3	5	4	4
BWBS	mw	/	103$	2	BWBSmw/103$/2	5	5	6	5	5	6	N	4	4	4	1	3	5	5	5	6
BWBS	mw	/	103$	3	BWBSmw/103$/3	5	5	6	5	5	6	N	4	2	2	1	3	3	5	5	6
BWBS	mw	/	103$	4	BWBSmw/103$/4	5	5	6	5	5	6	N	4	3	4	3	4	4	5	5	6
BWBS	mw	/	103$	5	BWBSmw/103$/5	5	5	6	5	5	6	L	3	4	4	3	4	4	5	4	5
BWBS	mw	/	103$	6	BWBSmw/103$/6	5	5	6	5	5	6	L	3	4	4	3	4	4	5	4	5
BWBS	mw	/	103$	7	BWBSmw/103$/7	5	5	6	5	5	6	L	3	4	4	3	4	4	5	4	4
BWBS	mw	/	103/102	2	BWBSmw/103/102/2	5	5	6	5	5	6	N	4	5	4	2	3	5	5	5	6
BWBS	mw	/	103/102	3	BWBSmw/103/102/3	5	5	6	5	5	6	N	4	3	3	2	3	3	5	5	6
BWBS	mw	/	103/102	4	BWBSmw/103/102/4	5	5	6	3	3	6	N	4	5	5	3	4	4	5	4	6
BWBS	mw	/	103/102	5	BWBSmw/103/102/5	5	5	6	2	2	6	L	3	5	5	3	4	4	5	4	5
BWBS	mw	/	103/102	6	BWBSmw/103/102/6	5	5	6	2	2	6	L	3	5	5	3	4	4	5	3	5
BWBS	mw	/	103/102	7	BWBSmw/103/102/7	5	5	6	2	2	6	L	3	5	5	3	4	4	5	3	5
BWBS	mw	/	103	2	BWBSmw/103/2	5	5	6	5	5	6	N	4	5	4	1	2	5	5	5	6
BWBS	mw	/	103	3	BWBSmw/103/3	5	5	6	5	5	6	N	4	3	3	1	2	3	5	5	6
BWBS	mw	/	103	4	BWBSmw/103/4	5	5	6	4	4	6	N	4	5	5	3	3	4	5	4	6
BWBS	mw	/	103	5	BWBSmw/103/5	5	5	6	3	3	6	L	3	5	5	3	3	4	5	4	5
BWBS	mw	/	103	6	BWBSmw/103/6	5	5	6	3	3	6	L	3	5	5	3	3	4	5	3	5
BWBS	mw	/	103	7	BWBSmw/103/7	5	5	6	3	3	6	L	3	5	5	3	3	4	5	3	5
BWBS	mw	/	104$	2	BWBSmw/104$/2	5	5	6	5	5	6	N	4	5	4	1	3	5	5	5	6
BWBS	mw	/	104$	3	BWBSmw/104$/3	5	5	6	5	5	6	N	4	2	2	1	3	3	5	5	6
BWBS	mw	/	104$	4	BWBSmw/104$/4	5	5	6	5	5	6	N	4	3	4	3	4	4	5	5	6
BWBS	mw	/	104$	5	BWBSmw/104$/5	5	5	6	5	5	6	L	3	4	4	3	4	4	5	4	5
BWBS	mw	/	104$	6	BWBSmw/104$/6	5	5	6	5	5	6	L	3	4	4	3	4	4	5	4	4
BWBS	mw	/	104$	7	BWBSmw/104$/7	5	5	6	5	5	6	L	3	4	4	3	4	4	5	4	4
BWBS	mw	/	104	2	BWBSmw/104/2	5	5	6	5	5	6	N	4	5	4	2	3	5	5	5	6
BWBS	mw	/	104	3	BWBSmw/104/3	5	5	6	5	5	6	N	4	4	4	2	3	4	5	5	6
BWBS	mw	/	104	4	BWBSmw/104/4	5	5	6	3	3	6	N	4	4	4	4	4	5	5	5	6
BWBS	mw	/	104	5	BWBSmw/104/5	5	5	6	2	2	6	N	4	4	4	4	4	5	5	4	5
BWBS	mw	/	104	6	BWBSmw/104/6	5	5	6	2	2	6	N	4	5	5	4	4	5	5	3	5
BWBS	mw	/	104	7	BWBSmw/104/7	5	5	6	2	2	6	N	4	5	5	4	4	5	5	3	5
BWBS	mw	/	110$	2	BWBSmw/110$/2	5	5	6	5	5	6	N	4	5	4	2	2	5	5	5	6
BWBS	mw	/	110$	3	BWBSmw/110$/3	5	5	6	5	5	6	N	4	1	1	2	2	4	5	5	6

BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
BWBS	mw	/	110$	4	BWBSmw/110$/4	5	5	6	5	5	6	N	4	1	1	3	3	5	5	4	6
BWBS	mw	/	110$	5	BWBSmw/110$/5	5	5	6	5	5	6	L	3	1	1	3	3	5	5	3	5
BWBS	mw	/	110$	6	BWBSmw/110$/6	5	5	6	5	5	6	L	3	2	2	3	3	5	5	2	4
BWBS	mw	/	110$	7	BWBSmw/110$/7	5	5	6	5	5	6	L	3	2	2	3	3	5	5	2	4
BWBS	mw	/	110	2	BWBSmw/110/2	5	5	6	5	5	6	N	4	5	4	3	2	4	5	5	6
BWBS	mw	/	110	3	BWBSmw/110/3	5	5	6	5	5	6	N	4	1	1	3	2	2	5	5	6
BWBS	mw	/	110	4	BWBSmw/110/4	5	5	6	4	4	6	N	4	1	1	4	3	3	5	3	6
BWBS	mw	/	110	5	BWBSmw/110/5	5	5	6	3	3	6	M	2	1	1	4	3	3	5	3	3
BWBS	mw	/	110	6	BWBSmw/110/6	5	5	6	3	3	6	M	2	2	2	4	3	3	5	1	2
BWBS	mw	/	110	7	BWBSmw/110/7	5	5	6	3	3	6	M	2	2	2	4	3	3	5	1	1
BWBS	mw	/	111$/112$	2	BWBSmw/111$/112/2	5	5	6	5	5	6	N	4	5	4	3	3	5	5	5	6
BWBS	mw	/	111$/112$	3	BWBSmw/111$/112/3	5	5	6	5	5	6	N	4	1	1	3	3	3	5	4	6
BWBS	mw	/	111$/112$	4	BWBSmw/111$/112/4	5	5	6	5	5	6	N	4	1	1	4	4	4	5	2	6
BWBS	mw	/	111$/112$	5	BWBSmw/111$/112/5	5	5	6	5	5	6	M	2	1	1	4	4	4	5	2	2
BWBS	mw	/	111$/112$	6	BWBSmw/111$/112/6	5	5	6	5	5	6	H	1	1	1	4	4	4	5	1	1
BWBS	mw	/	111$/112$	7	BWBSmw/111$/112/7	5	5	6	5	5	6	H	1	1	1	4	4	4	5	1	1
BWBS	mw	/	111$	2	BWBSmw/111$/2	5	5	6	5	5	6	N	4	5	4	3	3	5	5	5	6
BWBS	mw	/	111$	3	BWBSmw/111$/3	5	5	6	5	5	6	N	4	1	1	3	3	3	5	4	6
BWBS	mw	/	111$	4	BWBSmw/111$/4	5	5	6	5	5	6	N	4	1	1	4	4	4	5	3	6
BWBS	mw	/	111$	5	BWBSmw/111$/5	5	5	6	5	5	6	M	2	1	1	4	4	4	5	2	4
BWBS	mw	/	111$	6	BWBSmw/111$/6	5	5	6	5	5	6	M	2	1	1	4	4	4	5	1	3
BWBS	mw	/	111$	7	BWBSmw/111$/7	5	5	6	5	5	6	M	2	1	1	4	4	4	5	1	3
BWBS	mw	/	111	2	BWBSmw/111/2	5	5	6	5	5	6	N	4	5	4	3	2	4	5	5	6
BWBS	mw	/	111	3	BWBSmw/111/3	5	5	6	5	5	6	N	4	1	1	3	2	2	5	5	6
BWBS	mw	/	111	4	BWBSmw/111/4	5	5	6	4	4	6	N	4	2	2	4	3	3	5	4	6
BWBS	mw	/	111	5	BWBSmw/111/5	5	5	6	3	3	6	M	2	2	2	4	3	3	5	2	2
BWBS	mw	/	111	6	BWBSmw/111/6	5	5	6	3	3	6	M	2	3	3	4	3	3	5	1	1
BWBS	mw	/	111	7	BWBSmw/111/7	5	5	6	3	3	6	M	2	3	3	4	3	3	5	1	1
BWBS	wk	1	BA	1	BWBSwk1/00/BA/1	5	5	6	5	5	6	N	4	6	6	6	6	6	5	6	6
BWBS	wk	1	LA	/	BWBSwk1/00/LA	6	6	6	6	6	6	N	4	6	4	6	6	6	6	6	6
BWBS	wk	1	MA	2	BWBSwk1/00/MA/2	5	5	6	4	4	6	N	4	5	3	3	4	4	5	5	6
BWBS	wk	1	RI	/	BWBSwk1/00/RI	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
BWBS	wk	1	SA	2	BWBSwk1/00/SA/2	5	5	6	4	4	6	N	4	4	2	3	4	4	5	5	6
BWBS	wk	1	SA	3	BWBSwk1/00/SA/3	5	5	6	4	4	6	N	4	1	1	3	4	4	5	4	6
BWBS	wk	1	WA	/	BWBSwk1/00/WA	6	6	6	6	6	6	N	4	6	4	6	6	6	6	6	6
BWBS	wk	1	WB	2	BWBSwk1/00/WB/2	5	5	6	2	2	6	N	4	5	3	3	4	4	5	5	6
BWBS	wk	1	WB	3	BWBSwk1/00/WB/3	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	wk	1	WB	4	BWBSwk1/00/WB/4	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	wk	1	WB	5	BWBSwk1/00/WB/5	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	wk	1	WB	6	BWBSwk1/00/WB/6	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	wk	1	WB	7	BWBSwk1/00/WB/7	5	5	6	2	2	6	N	4	4	4	3	4	4	5	5	6
BWBS	wk	1	WE	2	BWBSwk1/00/WE/2	5	5	6	3	3	6	N	4	5	2	3	4	3	5	5	6
BWBS	wk	1	WE	3	BWBSwk1/00/WE/3	5	5	6	3	3	6	N	4	1	1	3	4	3	5	5	6
BWBS	wk	1	WS	2	BWBSwk1/00/WS/2	5	5	6	4	4	6	N	4	4	2	4	4	4	5	5	6
BWBS	wk	1	WS	3	BWBSwk1/00/WS/3	5	5	6	4	4	6	N	4	1	1	4	4	4	5	4	6
BWBS	wk	1	WS	4	BWBSwk1/00/WS/4	5	5	6	4	4	6	N	4	1	1	4	4	4	5	3	6
BWBS	wk	1	WS	5	BWBSwk1/00/WS/5	5	5	6	4	4	6	L	3	2	2	4	4	4	5	2	5
BWBS	wk	1	WS	6	BWBSwk1/00/WS/6	5	5	6	4	4	6	L	3	2	2	4	4	4	5	2	5
BWBS	wk	1	WS	7	BWBSwk1/00/WS/7	5	5	6	4	4	6	L	3	2	2	4	4	4	5	2	4
BWBS	wk	1	101$	2	BWBSwk1/101$/2	5	5	6	5	5	6	N	4	4	4	2	3	5	5	5	6
BWBS	wk	1	101$	3	BWBSwk1/101$/3	5	5	6	5	5	6	N	4	2	2	2	3	3	5	5	6
BWBS	wk	1	101$	4	BWBSwk1/101$/4	5	5	6	5	5	6	N	4	2	2	4	4	4	5	5	6
BWBS	wk	1	101$	5	BWBSwk1/101$/5	5	5	6	5	5	6	L	3	3	3	4	4	4	5	3	5

BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
BWBS	wk	1	101$	6	BWBSwk1/101$/6	5	5	6	5	5	6	M	2	3	3	4	4	4	5	3	4
BWBS	wk	1	101$	7	BWBSwk1/101$/7	5	5	6	5	5	6	M	2	3	3	4	4	4	5	3	4
BWBS	wk	1	101	2	BWBSwk1/101/2	5	5	6	5	5	6	N	4	5	4	4	3	4	5	5	6
BWBS	wk	1	101	3	BWBSwk1/101/3	5	5	6	5	5	6	N	4	3	3	4	3	2	5	5	6
BWBS	wk	1	101	4	BWBSwk1/101/4	5	5	6	3	3	6	N	4	4	4	5	4	3	5	5	6
BWBS	wk	1	101	5	BWBSwk1/101/5	5	5	6	2	2	6	L	3	4	4	5	4	3	5	3	4
BWBS	wk	1	101	6	BWBSwk1/101/6	5	5	6	2	2	6	L	3	4	4	5	4	3	5	3	4
BWBS	wk	1	101	7	BWBSwk1/101/7	5	5	6	2	2	6	L	3	4	4	5	4	3	5	3	3
BWBS	wk	1	102$	2	BWBSwk1/102$/2	5	5	6	4	4	6	N	4	5	4	2	2	5	5	5	6
BWBS	wk	1	102$	3	BWBSwk1/102$/3	5	5	6	4	4	6	N	4	3	3	2	2	3	5	5	6
BWBS	wk	1	102$	4	BWBSwk1/102$/4	5	5	6	4	4	6	N	4	3	3	3	3	4	5	5	6
BWBS	wk	1	102$	5	BWBSwk1/102$/5	5	5	6	4	4	6	L	3	4	4	3	3	4	5	4	5
BWBS	wk	1	102$	6	BWBSwk1/102$/6	5	5	6	4	4	6	L	3	4	4	3	3	4	5	4	5
BWBS	wk	1	102$	7	BWBSwk1/102$/7	5	5	6	4	4	6	L	3	4	4	3	3	4	5	4	5
BWBS	wk	1	102	2	BWBSwk1/102/2	5	5	6	5	5	6	N	4	5	4	4	3	5	5	5	6
BWBS	wk	1	102	3	BWBSwk1/102/3	5	5	6	5	5	6	N	4	4	4	4	3	3	5	5	6
BWBS	wk	1	102	4	BWBSwk1/102/4	5	5	6	2	2	6	N	4	5	5	5	4	4	5	5	6
BWBS	wk	1	102	5	BWBSwk1/102/5	5	5	6	1	1	6	N	4	5	5	5	4	4	5	4	5
BWBS	wk	1	102	6	BWBSwk1/102/6	5	5	6	1	1	6	N	4	5	5	5	4	4	5	4	5
BWBS	wk	1	102	7	BWBSwk1/102/7	5	5	6	1	1	6	N	4	5	5	5	4	4	5	4	5
BWBS	wk	1	103$	2	BWBSwk1/103$/2	5	5	6	5	5	6	N	4	5	4	1	2	5	5	5	6
BWBS	wk	1	103$	3	BWBSwk1/103$/3	5	5	6	5	5	6	N	4	2	3	1	2	3	5	5	6
BWBS	wk	1	103$	4	BWBSwk1/103$/4	5	5	6	5	5	6	N	4	3	3	3	3	4	5	5	6
BWBS	wk	1	103$	5	BWBSwk1/103$/5	5	5	6	5	5	6	L	3	4	4	3	3	4	5	4	5
BWBS	wk	1	103$	6	BWBSwk1/103$/6	5	5	6	5	5	6	L	3	4	4	3	3	4	5	4	5
BWBS	wk	1	103$	7	BWBSwk1/103$/7	5	5	6	5	5	6	L	3	4	4	3	3	4	5	4	4
BWBS	wk	1	103	2	BWBSwk1/103/2	5	5	6	5	5	6	N	4	5	4	3	2	5	5	5	6
BWBS	wk	1	103	3	BWBSwk1/103/3	5	5	6	5	5	6	N	4	3	3	3	2	3	5	5	6
BWBS	wk	1	103	4	BWBSwk1/103/4	5	5	6	3	3	6	N	4	5	5	4	3	4	5	5	6
BWBS	wk	1	103	5	BWBSwk1/103/5	5	5	6	2	2	6	N	4	5	5	4	3	4	5	4	5
BWBS	wk	1	103	6	BWBSwk1/103/6	5	5	6	2	2	6	N	4	5	5	4	3	4	5	4	5
BWBS	wk	1	103	7	BWBSwk1/103/7	5	5	6	2	2	6	N	4	5	5	4	3	4	5	4	5
BWBS	wk	1	104$	2	BWBSwk1/104$/2	5	5	6	4	4	6	N	4	5	4	2	3	4	5	5	6
BWBS	wk	1	104$	3	BWBSwk1/104$/3	5	5	6	4	4	6	N	4	2	2	2	3	2	5	5	6
BWBS	wk	1	104$	4	BWBSwk1/104$/4	5	5	6	4	4	6	N	4	3	4	3	4	3	5	5	6
BWBS	wk	1	104$	5	BWBSwk1/104$/5	5	5	6	4	4	6	L	3	4	4	3	4	3	5	4	4
BWBS	wk	1	104$	6	BWBSwk1/104$/6	5	5	6	4	4	6	L	3	4	4	3	4	3	5	4	4
BWBS	wk	1	104$	7	BWBSwk1/104$/7	5	5	6	4	4	6	L	3	4	4	3	4	3	5	4	4
BWBS	wk	1	104	2	BWBSwk1/104/2	5	5	6	5	5	6	N	4	5	4	4	3	4	5	5	6
BWBS	wk	1	104	3	BWBSwk1/104/3	5	5	6	5	5	6	N	4	4	4	4	3	2	5	5	6
BWBS	wk	1	104	4	BWBSwk1/104/4	5	5	6	3	3	6	N	4	4	4	5	4	3	5	5	6
BWBS	wk	1	104	5	BWBSwk1/104/5	5	5	6	2	2	6	N	4	4	4	5	4	3	5	4	5
BWBS	wk	1	104	6	BWBSwk1/104/6	5	5	6	2	2	6	N	4	5	5	5	4	3	5	3	5
BWBS	wk	1	104	7	BWBSwk1/104/7	5	5	6	2	2	6	N	4	5	5	5	4	3	5	3	5
BWBS	wk	1	110$	2	BWBSwk1/110$/2	5	5	6	5	5	6	N	4	5	4	3	4	5	5	5	6
BWBS	wk	1	110$	3	BWBSwk1/110$/3	5	5	6	5	5	6	N	4	1	1	3	4	3	5	5	6
BWBS	wk	1	110$	4	BWBSwk1/110$/4	5	5	6	5	5	6	N	4	1	1	4	5	4	5	4	6
BWBS	wk	1	110$	5	BWBSwk1/110$/5	5	5	6	5	5	6	L	3	1	1	4	5	4	5	3	4
BWBS	wk	1	110$	6	BWBSwk1/110$/6	5	5	6	5	5	6	L	3	2	2	4	5	4	5	2	4
BWBS	wk	1	110$	7	BWBSwk1/110$/7	5	5	6	5	5	6	L	3	2	2	4	5	4	5	2	4
BWBS	wk	1	110/111	2	BWBSwk1/110/111/2	5	5	6	5	5	6	L	3	5	4	4	3	5	5	5	6
BWBS	wk	1	110/111	3	BWBSwk1/110/111/3	5	5	6	5	5	6	L	3	1	1	4	3	3	5	5	6
BWBS	wk	1	110/111	4	BWBSwk1/110/111/4	5	5	6	4	4	6	L	3	2	2	5	4	4	5	4	6

BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
BWBS	wk	1	110/111	5	BWBSwk1/110/111/5	5	5	6	3	3	6	M	2	2	2	5	4	4	5	3	2
BWBS	wk	1	110/111	6	BWBSwk1/110/111/6	5	5	6	3	3	6	M	2	3	3	5	4	4	5	2	2
BWBS	wk	1	110/111	7	BWBSwk1/110/111/7	5	5	6	3	3	6	M	2	3	3	5	4	4	5	2	2
BWBS	wk	1	110	2	BWBSwk1/110/2	5	5	6	5	5	6	N	4	5	4	4	2	4	5	5	6
BWBS	wk	1	110	3	BWBSwk1/110/3	5	5	6	5	5	6	N	4	1	1	4	2	2	5	5	6
BWBS	wk	1	110	4	BWBSwk1/110/4	5	5	6	4	4	6	N	4	2	2	5	3	3	5	4	6
BWBS	wk	1	110	5	BWBSwk1/110/5	5	5	6	3	3	6	M	2	2	2	5	3	3	5	2	2
BWBS	wk	1	110	6	BWBSwk1/110/6	5	5	6	3	3	6	M	2	3	3	5	3	3	5	1	1
BWBS	wk	1	110	7	BWBSwk1/110/7	5	5	6	3	3	6	M	2	3	3	5	3	3	5	1	1
ESSF	mv	2	BA	1	ESSFmv2/00/BA/1	5	5	6	5	5	6	N	4	6	6	6	5	6	5	6	6
ESSF	mv	2	LA	/	ESSFmv2/00/LA	6	6	6	6	6	6	N	4	6	4	6	6	6	6	6	6
ESSF	mv	2	MA	2	ESSFmv2/00/MA/2	4	5	6	5	5	6	N	4	5	3	5	3	3	5	5	6
ESSF	mv	2	RI	/	ESSFmv2/00/RI	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
ESSF	mv	2	SA	2	ESSFmv2/00/SA/2	4	4	6	5	5	6	N	4	6	4	4	3	3	5	5	6
ESSF	mv	2	SA	3	ESSFmv2/00/SA/3	4	4	6	5	5	6	N	4	4	2	4	3	3	5	5	6
ESSF	mv	2	WB	1	ESSFmv2/00/WB/1	4	4	6	3	3	6	N	4	6	5	4	3	4	5	6	6
ESSF	mv	2	WB	2	ESSFmv2/00/WB/2	4	4	6	3	3	6	N	4	6	5	4	3	3	5	6	6
ESSF	mv	2	WB	3	ESSFmv2/00/WB/3	4	4	6	3	3	6	N	4	5	4	4	3	3	5	5	6
ESSF	mv	2	WB	4	ESSFmv2/00/WB/4	4	4	6	3	3	6	N	4	5	4	4	3	3	5	5	6
ESSF	mv	2	WB	5	ESSFmv2/00/WB/5	4	4	6	3	3	6	N	4	5	4	4	4	4	5	5	6
ESSF	mv	2	WB	6	ESSFmv2/00/WB/6	4	4	6	3	3	6	N	4	5	4	4	4	4	5	4	6
ESSF	mv	2	WB	7	ESSFmv2/00/WB/7	4	4	6	3	3	6	N	4	5	4	4	4	4	5	4	6
ESSF	mv	2	WE	2	ESSFmv2/00/WE/2	5	4	6	4	4	6	N	4	5	3	4	2	3	5	5	6
ESSF	mv	2	WE	3	ESSFmv2/00/WE/3	5	4	6	4	4	6	N	4	4	2	4	2	3	5	5	6
ESSF	mv	2	WH	2	ESSFmv2/00/WH/2	4	5	6	5	5	6	N	4	6	2	3	3	3	5	6	6
ESSF	mv	2	WS	2	ESSFmv2/00/WS/2	4	4	6	5	5	6	N	4	6	3	5	3	5	5	6	6
ESSF	mv	2	WS	3	ESSFmv2/00/WS/3	4	4	6	5	5	6	N	4	4	2	5	3	5	5	5	6
ESSF	mv	2	WS	4	ESSFmv2/00/WS/4	4	4	6	5	5	6	N	4	5	2	5	3	2	5	5	6
ESSF	mv	2	WS	5	ESSFmv2/00/WS/5	4	4	6	5	5	6	N	4	5	3	5	3	2	5	5	6
ESSF	mv	2	WS	6	ESSFmv2/00/WS/6	4	4	6	5	5	6	N	4	5	3	5	3	2	5	4	6
ESSF	mv	2	WS	7	ESSFmv2/00/WS/7	4	4	6	5	5	6	N	4	5	3	5	3	2	5	4	6
ESSF	mv	2	01/03/04/	2	ESSFmv2/01/03/04/2	4	4	6	5	5	6	N	4	6	5	4	2	3	4	6	6
ESSF	mv	2	01/03/04/	3	ESSFmv2/01/03/04/3	4	4	6	5	5	6	N	4	5	4	4	2	2	4	5	6
ESSF	mv	2	01/03/04/	4	ESSFmv2/01/03/04/4	4	4	6	4	4	6	N	4	5	4	4	3	2	4	5	6
ESSF	mv	2	01/03/04/	5	ESSFmv2/01/03/04/5	4	4	6	3	3	6	N	4	5	4	4	3	2	4	5	6
ESSF	mv	2	01/03/04/	6	ESSFmv2/01/03/04/6	4	4	6	3	3	6	N	4	5	4	4	3	2	4	4	6
ESSF	mv	2	01/03/04/	7	ESSFmv2/01/03/04/7	4	4	6	3	3	6	N	4	5	4	4	3	2	4	4	6
ESSF	mv	2	01	2	ESSFmv2/01/2	4	4	6	5	5	6	N	4	6	5	4	2	3	4	6	6
ESSF	mv	2	01	3	ESSFmv2/01/3	4	4	6	5	5	6	N	4	5	4	4	2	2	4	5	6
ESSF	mv	2	01	4	ESSFmv2/01/4	4	4	6	4	4	6	N	4	5	4	4	3	2	4	5	6
ESSF	mv	2	01	5	ESSFmv2/01/5	4	4	6	3	3	6	N	4	5	4	4	3	2	4	5	6
ESSF	mv	2	01	6	ESSFmv2/01/6	4	4	6	3	3	6	N	4	5	5	4	3	2	4	4	6
ESSF	mv	2	01	7	ESSFmv2/01/7	4	4	6	3	3	6	N	4	5	5	4	3	2	4	4	6
ESSF	mv	2	02	2	ESSFmv2/02/2	4	3	6	5	5	6	N	4	6	6	4	2	3	4	6	6
ESSF	mv	2	02	3	ESSFmv2/02/3	4	3	6	5	5	6	N	4	5	5	4	2	2	4	6	6
ESSF	mv	2	02	4	ESSFmv2/02/4	4	3	6	4	4	6	N	4	5	5	4	3	3	4	6	6
ESSF	mv	2	02	5	ESSFmv2/02/5	4	3	6	3	3	6	N	4	5	5	4	3	3	4	5	6
ESSF	mv	2	02	6	ESSFmv2/02/6	4	3	6	3	3	6	N	4	5	5	4	3	3	4	4	6
ESSF	mv	2	02	7	ESSFmv2/02/7	4	3	6	3	3	6	N	4	5	5	4	3	3	4	4	6
ESSF	mv	2	03	2	ESSFmv2/03/2	4	3	6	5	5	6	N	4	6	5	4	2	3	4	6	6
ESSF	mv	2	03	3	ESSFmv2/03/3	4	3	6	5	5	6	N	4	5	5	4	2	2	4	5	6
ESSF	mv	2	03	4	ESSFmv2/03/4	4	3	6	4	4	6	N	4	5	5	4	3	2	4	5	6
ESSF	mv	2	03	5	ESSFmv2/03/5	4	3	6	3	3	6	N	4	5	5	4	3	2	4	5	6

BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
ESSF	mv	2	03	6	ESSFmv2/03/6	4	3	6	3	3	6	N	4	5	5	4	3	2	4	4	6
ESSF	mv	2	03	7	ESSFmv2/03/7	4	3	6	3	3	6	N	4	5	5	4	3	2	4	4	6
ESSF	mv	2	04	2	ESSFmv2/04/2	4	4	6	5	5	6	N	4	6	4	4	2	3	4	6	6
ESSF	mv	2	04	3	ESSFmv2/04/3	4	4	6	5	5	6	N	4	5	3	4	2	2	4	5	6
ESSF	mv	2	04	4	ESSFmv2/04/4	4	4	6	4	4	6	N	4	5	3	4	3	2	4	5	6
ESSF	mv	2	04	5	ESSFmv2/04/5	4	4	6	4	4	6	N	4	5	3	4	3	2	4	4	6
ESSF	mv	2	04	6	ESSFmv2/04/6	4	4	6	4	4	6	N	4	5	4	4	3	2	4	4	6
ESSF	mv	2	04	7	ESSFmv2/04/7	4	4	6	4	4	6	N	4	5	4	4	3	2	4	3	6
ESSF	mv	2	05	2	ESSFmv2/05/2	4	4	6	5	5	6	N	4	6	4	4	2	3	4	6	6
ESSF	mv	2	05	3	ESSFmv2/05/3	4	4	6	5	5	6	N	4	5	3	4	2	2	4	5	6
ESSF	mv	2	05	4	ESSFmv2/05/4	4	4	6	5	5	6	N	4	5	3	4	3	2	4	5	6
ESSF	mv	2	05	5	ESSFmv2/05/5	4	4	6	4	4	6	N	4	5	3	4	3	2	4	4	6
ESSF	mv	2	05	6	ESSFmv2/05/6	4	4	6	4	4	6	N	4	5	3	4	3	2	4	4	6
ESSF	mv	2	05	7	ESSFmv2/05/7	4	4	6	4	4	6	N	4	5	3	4	3	2	4	3	6
ESSF	mv	2	06	2	ESSFmv2/06/2	4	5	6	5	5	6	N	4	6	5	4	2	3	4	6	6
ESSF	mv	2	06	3	ESSFmv2/06/3	4	5	6	5	5	6	N	4	5	3	4	2	2	4	5	6
ESSF	mv	2	06	4	ESSFmv2/06/4	4	5	6	5	5	6	N	4	5	3	4	3	2	4	5	6
ESSF	mv	2	06	5	ESSFmv2/06/5	4	5	6	4	4	6	N	4	5	3	4	3	2	4	4	6
ESSF	mv	2	06	6	ESSFmv2/06/6	4	5	6	4	4	6	N	4	5	4	4	3	2	4	4	6
ESSF	mv	2	06	7	ESSFmv2/06/7	4	5	6	4	4	6	N	4	5	4	4	3	2	4	4	6
ESSF	mvp	/	BA	1	ESSFmvp/00/BA/1	5	5	2	5	5	2	N	4	6	6	6	5	6	2	6	6
ESSF	mvp	/	BC	2	ESSFmvp/00/BC/2	3	3	2	5	3	2	N	4	6	5	5	2	5	1	5	6
ESSF	mvp	/	BC	3	ESSFmvp/00/BC/3	3	3	2	5	3	2	N	4	6	5	5	2	5	1	5	6
ESSF	mvp	/	BC	4	ESSFmvp/00/BC/4	3	3	2	5	3	2	N	4	6	5	5	2	5	1	5	6
ESSF	mvp	/	BC	5	ESSFmvp/00/BC/5	3	3	2	5	3	2	N	4	6	5	5	2	5	1	5	6
ESSF	mvp	/	BC	6	ESSFmvp/00/BC/6	3	3	2	5	3	2	N	4	6	5	5	2	5	1	5	6
ESSF	mvp	/	BC	7	ESSFmvp/00/BC/7	3	3	2	5	3	2	N	4	6	5	5	2	5	1	5	6
ESSF	mvp	/	BV	2	ESSFmvp/00/BV/2	4	4	3	5	4	3	N	4	6	3	5	1	1	4	6	6
ESSF	mvp	/	BV	3	ESSFmvp/00/BV/3	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	mvp	/	BV	4	ESSFmvp/00/BV/4	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	mvp	/	BV	5	ESSFmvp/00/BV/5	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	mvp	/	BV	6	ESSFmvp/00/BV/6	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	mvp	/	BV	7	ESSFmvp/00/BV/7	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	mvp	/	FM	2	ESSFmvp/00/FM/2	4	5	3	5	5	3	N	4	6	4	5	1	1	5	6	6
ESSF	mvp	/	FM	3	ESSFmvp/00/FM/3	4	5	3	5	5	3	N	4	6	4	5	1	1	5	5	6
ESSF	mvp	/	FM	4	ESSFmvp/00/FM/4	4	5	3	5	5	3	N	4	6	4	5	1	1	5	5	6
ESSF	mvp	/	FM	5	ESSFmvp/00/FM/5	4	5	3	5	5	3	N	4	6	4	5	1	1	5	5	6
ESSF	mvp	/	FM	6	ESSFmvp/00/FM/6	4	5	3	5	5	3	N	4	6	4	5	1	1	5	5	6
ESSF	mvp	/	FM	7	ESSFmvp/00/FM/7	4	5	3	5	5	3	N	4	6	4	5	1	1	5	5	6
ESSF	mvp	/	HE	2	ESSFmvp/00/HE/2	3	2	2	5	2	2	N	4	6	5	4	2	2	1	6	6
ESSF	mvp	/	LA	/	ESSFmvp/00/LA	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
ESSF	mvp	/	MA	2	ESSFmvp/00/MA/2	5	5	6	5	5	6	N	4	6	4	5	3	3	5	6	6
ESSF	mvp	/	SA	2	ESSFmvp/00/SA/2	3	3	6	5	3	6	N	4	6	4	5	3	3	5	6	6
ESSF	mvp	/	SA	3	ESSFmvp/00/SA/3	3	3	6	5	3	6	N	4	6	3	5	3	3	5	5	6
ESSF	mvp	/	WA	/	ESSFmvp/00/WA	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
ESSF	mvp	/	WE	2	ESSFmvp/00/WE/2	4	3	4	5	3	4	N	4	6	4	5	2	2	5	6	6
ESSF	mvp	/	WE	3	ESSFmvp/00/WE/3	4	2	4	5	2	4	N	4	6	2	5	2	2	5	5	6
ESSF	wc	3	BA	1	ESSFwc3/00/BA/1	5	5	6	5	5	6	N	4	6	6	6	5	6	5	6	6
ESSF	wc	3	LA	/	ESSFwc3/00/LA	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
ESSF	wc	3	WE	2	ESSFwc3/00/WE/2	5	4	6	4	4	6	N	4	6	3	5	2	3	5	6	6
ESSF	wc	3	WE	3	ESSFwc3/00/WE/3	5	4	6	4	4	6	N	4	5	2	5	2	3	5	5	6
ESSF	wc	3	WE	4	ESSFwc3/00/WE/4	5	4	6	4	4	6	N	4	5	4	5	2	3	5	5	6
ESSF	wc	3	WE	5	ESSFwc3/00/WE/5	5	4	6	4	4	6	N	4	5	4	5	2	3	5	5	6

BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
ESSF	wc	3	WE	6	ESSFwc3/00/WE/6	5	4	6	4	4	6	N	4	5	4	5	2	3	5	5	6
ESSF	wc	3	WE	7	ESSFwc3/00/WE/7	5	4	6	4	4	6	N	4	5	4	5	2	3	5	5	6
ESSF	wc	3	01	2	ESSFwc3/01/2	4	4	6	5	5	6	N	4	6	5	4	2	4	4	6	6
ESSF	wc	3	01	3	ESSFwc3/01/3	4	4	6	5	5	6	N	4	5	4	4	2	2	4	5	6
ESSF	wc	3	01	4	ESSFwc3/01/4	4	4	6	5	5	6	N	4	5	4	4	3	3	4	5	6
ESSF	wc	3	01	5	ESSFwc3/01/5	4	4	6	5	5	6	N	4	5	4	4	3	3	4	4	6
ESSF	wc	3	01	6	ESSFwc3/01/6	4	4	6	5	5	6	N	4	5	4	4	3	3	4	4	6
ESSF	wc	3	01	7	ESSFwc3/01/7	4	4	6	5	5	6	N	4	5	4	4	3	3	4	4	6
ESSF	wc	3	02	2	ESSFwc3/02/2	4	3	6	5	5	6	N	4	6	5	4	2	5	4	6	6
ESSF	wc	3	02	3	ESSFwc3/02/3	4	3	6	5	5	6	N	4	5	5	4	2	3	4	5	6
ESSF	wc	3	02	4	ESSFwc3/02/4	4	3	6	5	5	6	N	4	5	5	4	3	4	4	5	6
ESSF	wc	3	02	5	ESSFwc3/02/5	4	3	6	4	4	6	N	4	5	5	4	3	4	4	5	6
ESSF	wc	3	02	6	ESSFwc3/02/6	4	3	6	4	4	6	N	4	5	5	4	3	4	4	5	6
ESSF	wc	3	02	7	ESSFwc3/02/7	4	3	6	4	4	6	N	4	5	5	4	3	4	4	5	6
ESSF	wc	3	03	2	ESSFwc3/03/2	4	4	6	5	5	6	N	4	6	3	4	2	4	4	6	6
ESSF	wc	3	03	3	ESSFwc3/03/3	4	4	6	5	5	6	N	4	5	3	4	2	2	4	5	6
ESSF	wc	3	03	4	ESSFwc3/03/4	4	4	6	5	5	6	N	4	5	3	4	3	3	4	5	6
ESSF	wc	3	03	5	ESSFwc3/03/5	4	4	6	5	5	6	N	4	5	3	4	3	3	4	5	6
ESSF	wc	3	03	6	ESSFwc3/03/6	4	4	6	5	5	6	N	4	5	3	4	3	3	4	5	6
ESSF	wc	3	03	7	ESSFwc3/03/7	4	4	6	5	5	6	N	4	5	3	4	3	3	4	5	6
ESSF	wcp	/	BA	1	ESSFwcp/00/BA/1	5	5	2	5	5	2	N	4	6	6	6	5	6	4	6	6
ESSF	wcp	/	BC	3	ESSFwcp/00/BC/3	3	3	2	5	3	2	N	4	6	5	5	2	2	1	5	6
ESSF	wcp	/	BC	5	ESSFwcp/00/BC/5	3	3	2	5	3	2	N	4	6	5	5	2	2	1	5	6
ESSF	wcp	/	BC	6	ESSFwcp/00/BC/6	3	3	2	5	3	2	N	4	6	5	5	2	2	1	5	6
ESSF	wcp	/	BC	7	ESSFwcp/00/BC/7	3	3	2	5	3	2	N	4	6	5	5	2	2	1	5	6
ESSF	wcp	/	BV	3	ESSFwcp/00/BV/3	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	wcp	/	BV	5	ESSFwcp/00/BV/5	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	wcp	/	BV	6	ESSFwcp/00/BV/6	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	wcp	/	BV	7	ESSFwcp/00/BV/7	4	4	3	5	4	3	N	4	6	3	5	1	1	4	5	6
ESSF	wcp	/	FM	2	ESSFwcp/00/FM/2	4	5	3	5	5	3	N	4	6	4	5	1	1	5	6	6
ESSF	wcp	/	HE	2	ESSFwcp/00/HE/2	3	2	2	5	2	2	N	4	6	5	4	2	2	1	6	6
ESSF	wcp	/	LA	/	ESSFwcp/00/LA	6	6	6	6	6	6	N	4	6	5	6	6	6	6	6	6
ESSF	wcp	/	WE	2	ESSFwcp/00/WE/2	4	3	4	5	3	4	N	4	6	4	5	2	2	5	6	6
ESSF	wcp	/	WE	3	ESSFwcp/00/WE/3	4	2	4	5	2	4	N	4	6	2	5	2	2	5	5	6
ESSF	wcp	/	BC	2	ESSFwcp/00/BC/2	3	3	2	5	3	2	N	4	6	5	5	2	5	1	6	6
ESSF	wcp	/	BC	4	ESSFwcp/00/BC/4	3	3	2	5	3	2	N	4	6	5	5	2	5	1	5	6
ESSF	wk	2	BA	1	ESSFwk2/00/BA/1	5	5	6	5	5	6	N	4	6	6	6	5	6	5	6	6
ESSF	wk	2	LA	/	ESSFwk2/00/LA	6	6	6	6	6	6	N	4	6	4	6	6	6	6	6	6
ESSF	wk	2	WE	2	ESSFwk2/00/WE/2	5	4	6	4	4	6	N	4	6	3	4	2	3	5	6	6
ESSF	wk	2	WE	3	ESSFwk2/00/WE/3	5	4	6	4	4	6	N	4	5	2	4	3	3	5	5	6
ESSF	wk	2	WE	4	ESSFwk2/00/WE/4	5	4	6	4	4	6	N	4	5	3	4	2	3	5	5	6
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ESSF	wk	2	WE	6	ESSFwk2/00/WE/6	5	4	6	4	4	6	N	4	5	3	4	2	3	5	5	6
ESSF	wk	2	WE	7	ESSFwk2/00/WE/7	5	4	6	4	4	6	N	4	5	3	4	2	3	5	5	6
ESSF	wk	2	01/03/	2	ESSFwk2/01/03/2	4	4	6	5	5	6	N	4	6	5	4	2	3	4	6	6
ESSF	wk	2	01/03/	3	ESSFwk2/01/03/3	4	4	6	5	5	6	N	4	5	3	4	3	2	4	5	6
ESSF	wk	2	01/03/	4	ESSFwk2/01/03/4	4	4	6	5	5	6	N	4	5	3	4	3	2	4	5	6
ESSF	wk	2	01/03/	5	ESSFwk2/01/03/5	4	4	6	4	4	6	N	4	5	4	4	3	2	4	4	6
ESSF	wk	2	01/03/	6	ESSFwk2/01/03/6	4	4	6	4	4	6	N	4	5	4	4	3	2	4	4	6
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BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
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BGC_Zone	BGC_Subzone	BGC_Variant	Site_Series	Structural_Stage	PEM_Conn	M_RATA_Q_LI_W	M_RATA_Q_LI_G	M_RATA_Q_RB	M_RATA_BR_LI_W	M_RATA_BR_LI_G	M_RATA_BR_RB	B_BTNW_RE	B_BTNW_RE	M_ALAL_LI_W	M_ALAL_LI_G	M_URAR_LI_P	M_URAR_LI_S	M_URAR_LI_F	M_URAR_HI	M_MAPE_LI_A	M_MAPE_BI
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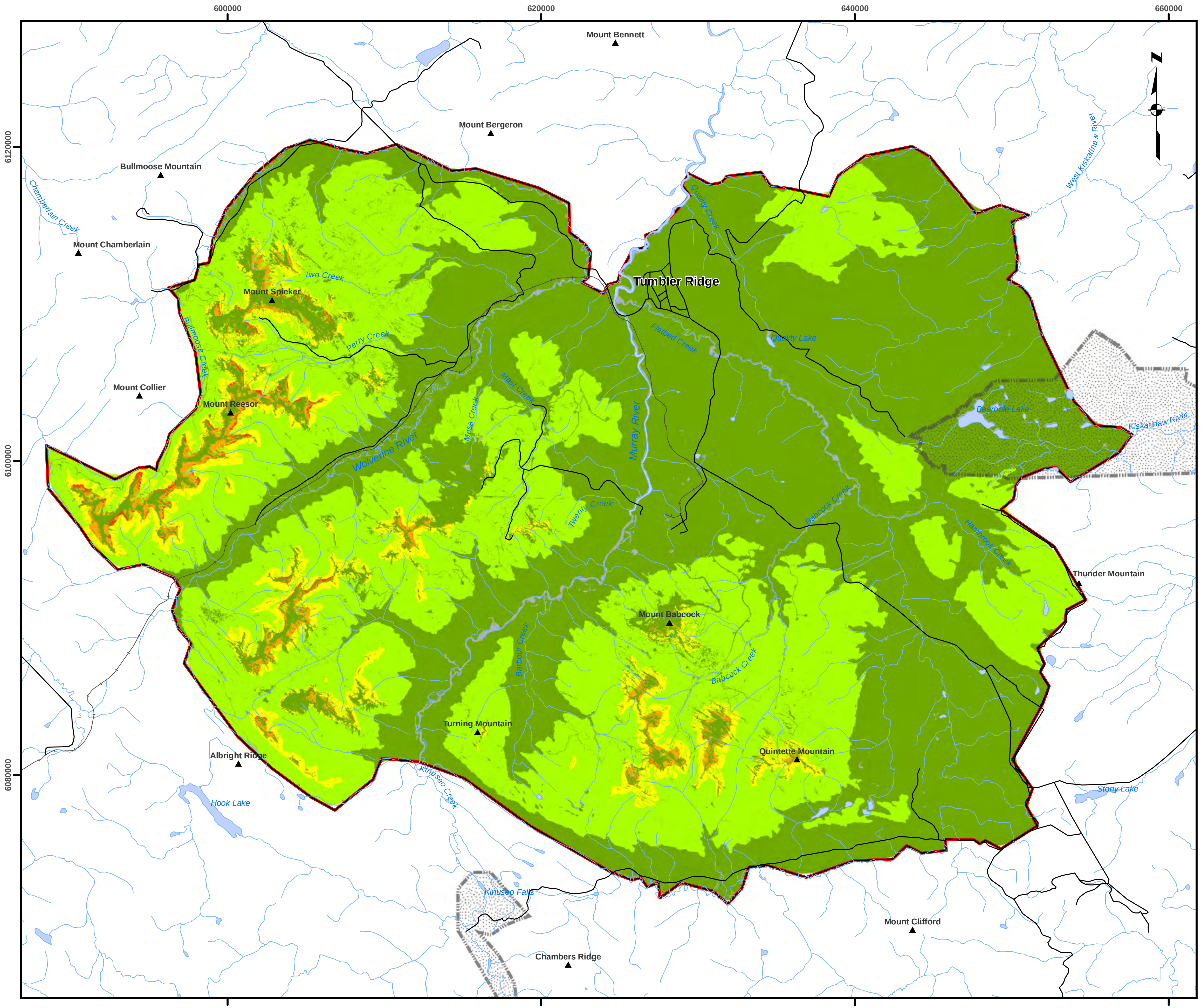
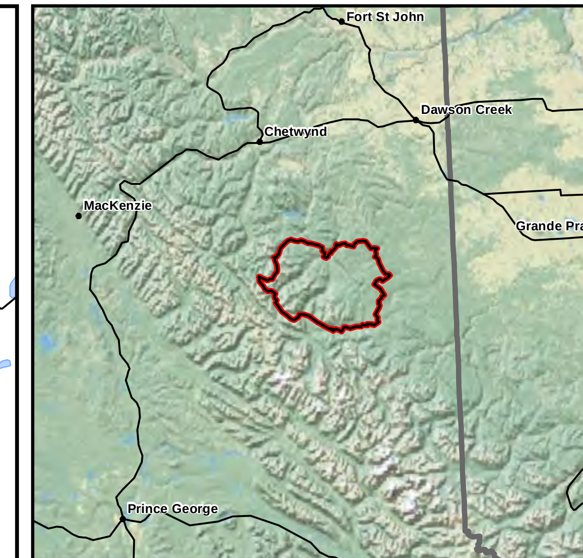
APPENDIX E WILDLIFE HABITAT SUITABILITY MAPS





LEGEND

Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Woodland Caribou, Quintette Herd, Winter Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

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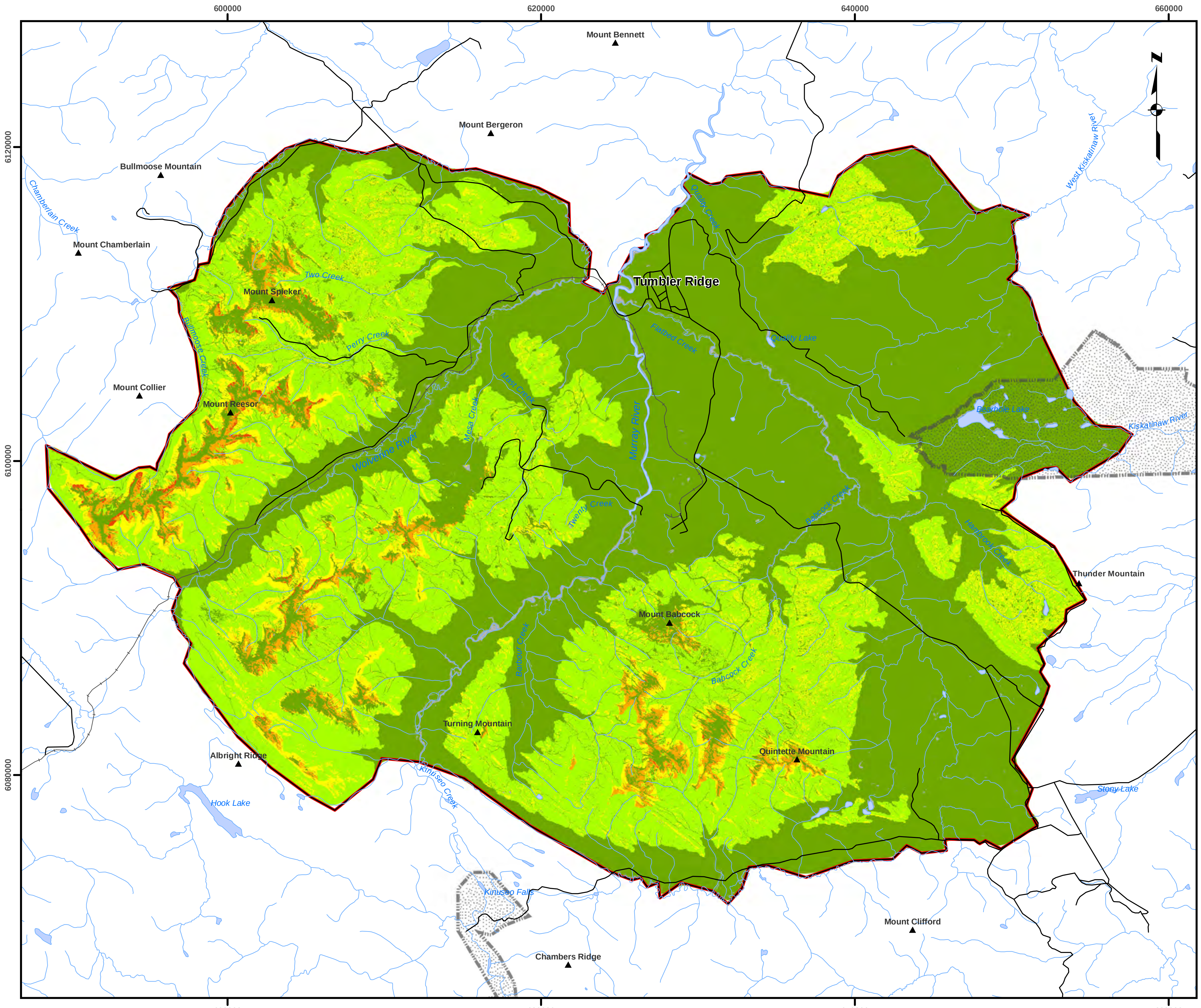

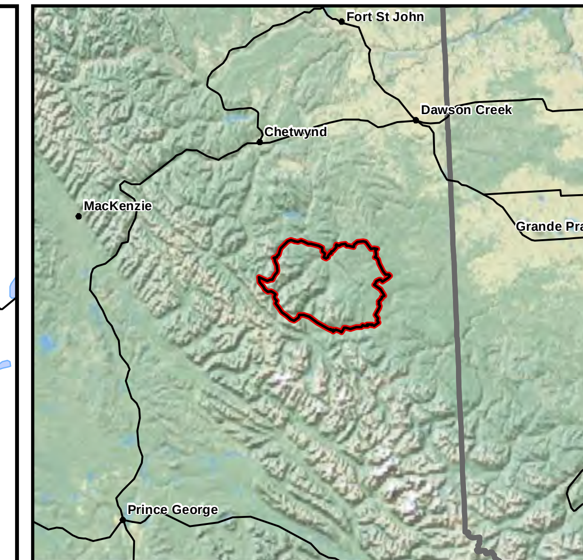

LEGEND

Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project Wildlife Habitat Ratings

Woodland Caribou, Quintette Herd, Growing Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

EDI

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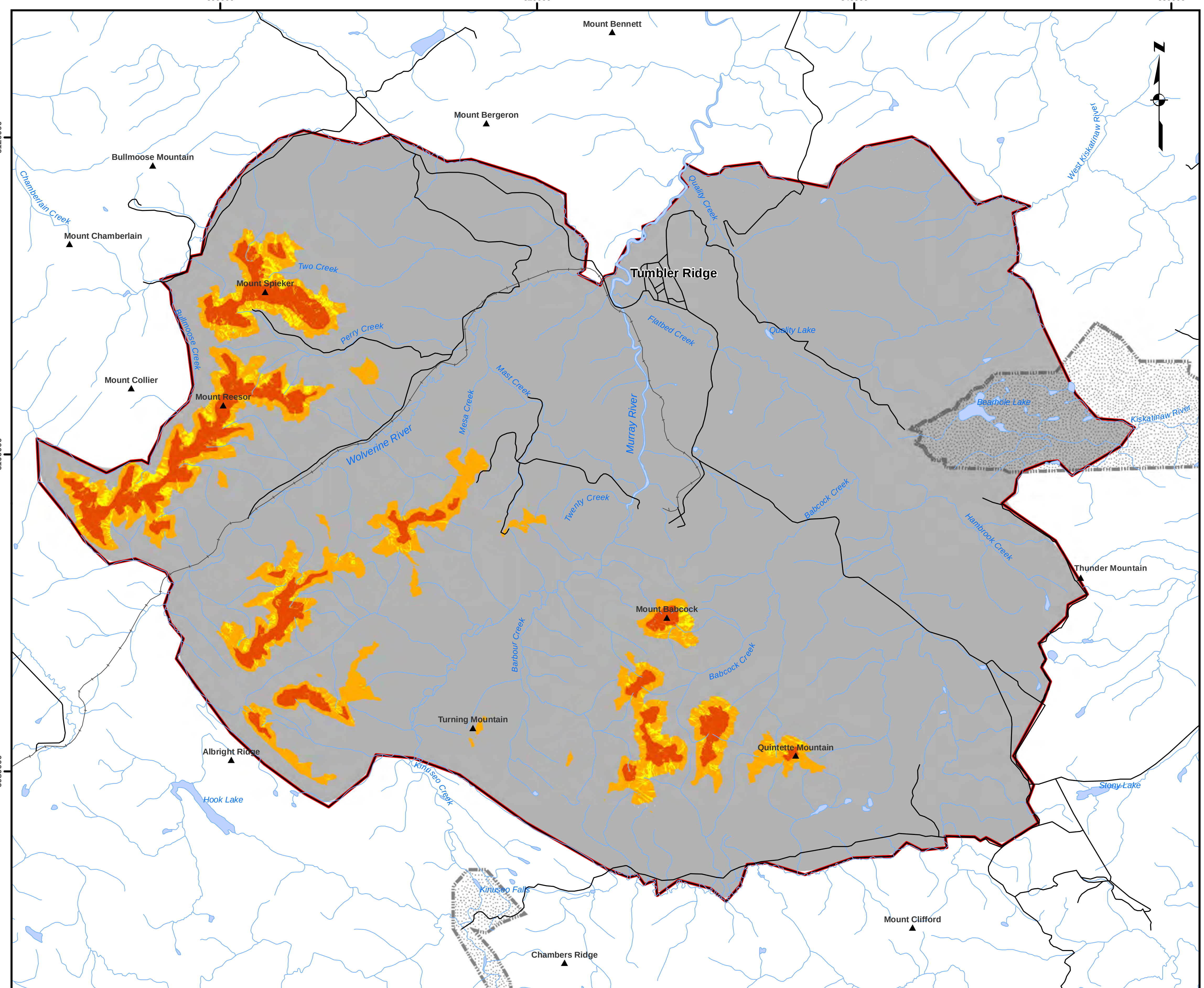

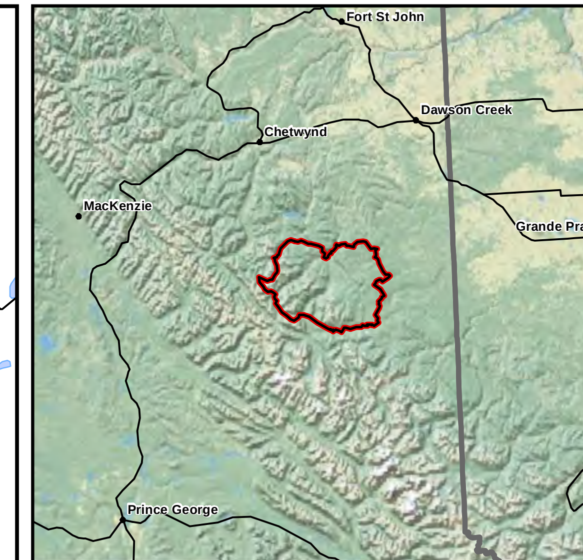

LEGEND

Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Woodland Caribou, Quintette Herd, Birthing Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

EDI

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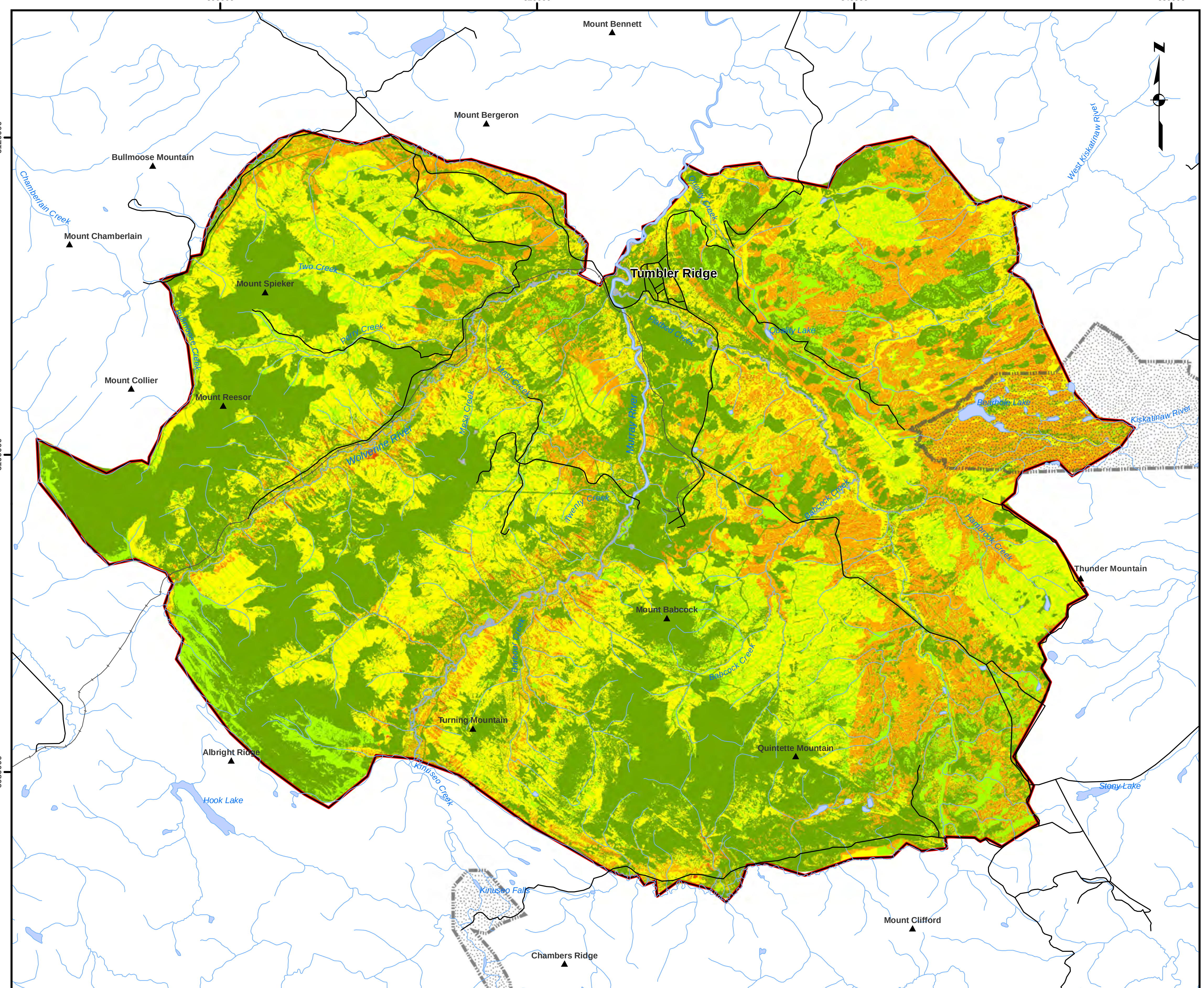

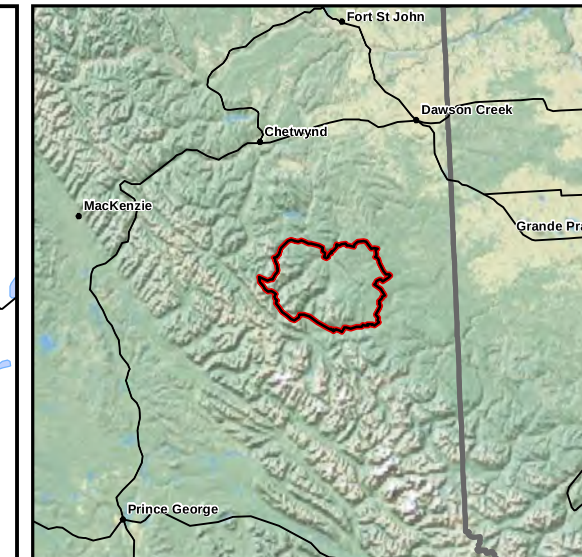

LEGEND

Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Woodland Caribou, Bearhole/Redwillow Herd, Winter Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

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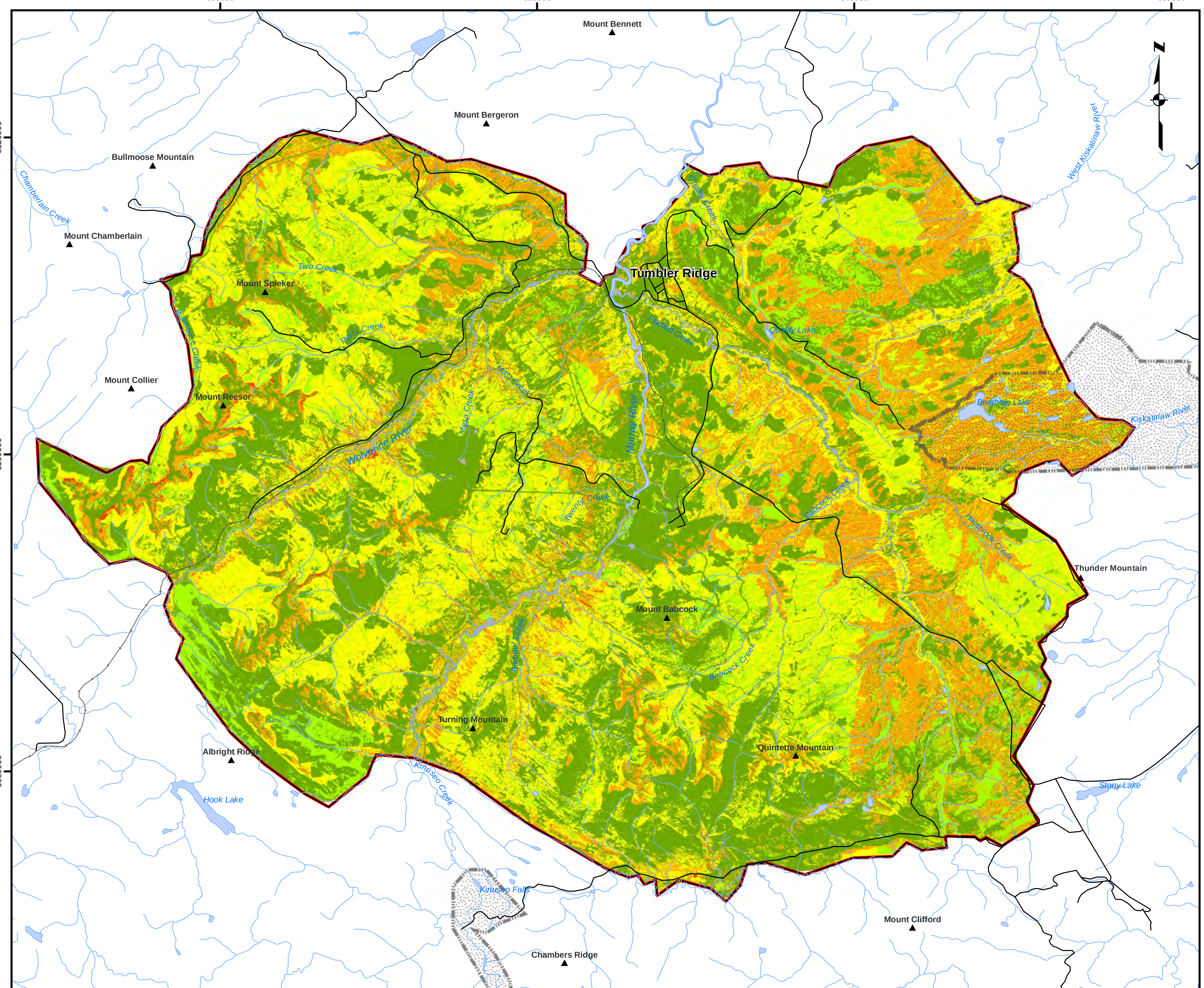
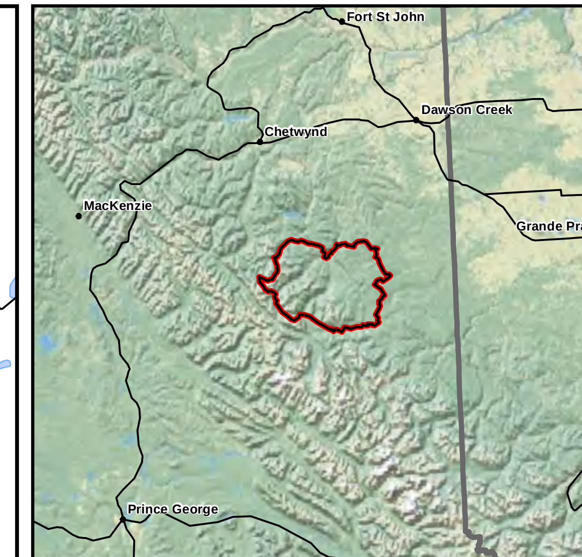




LEGEND

Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

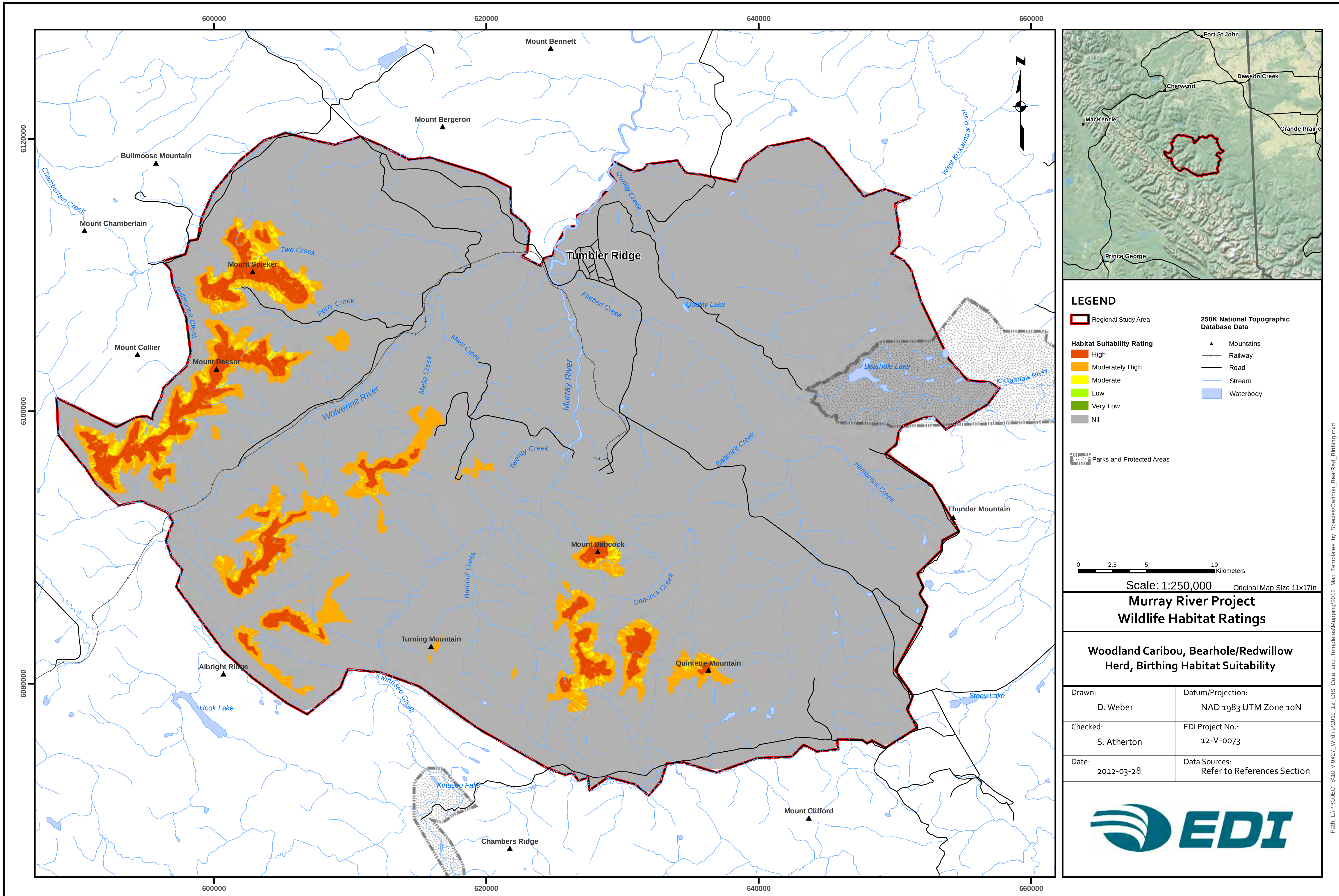
Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

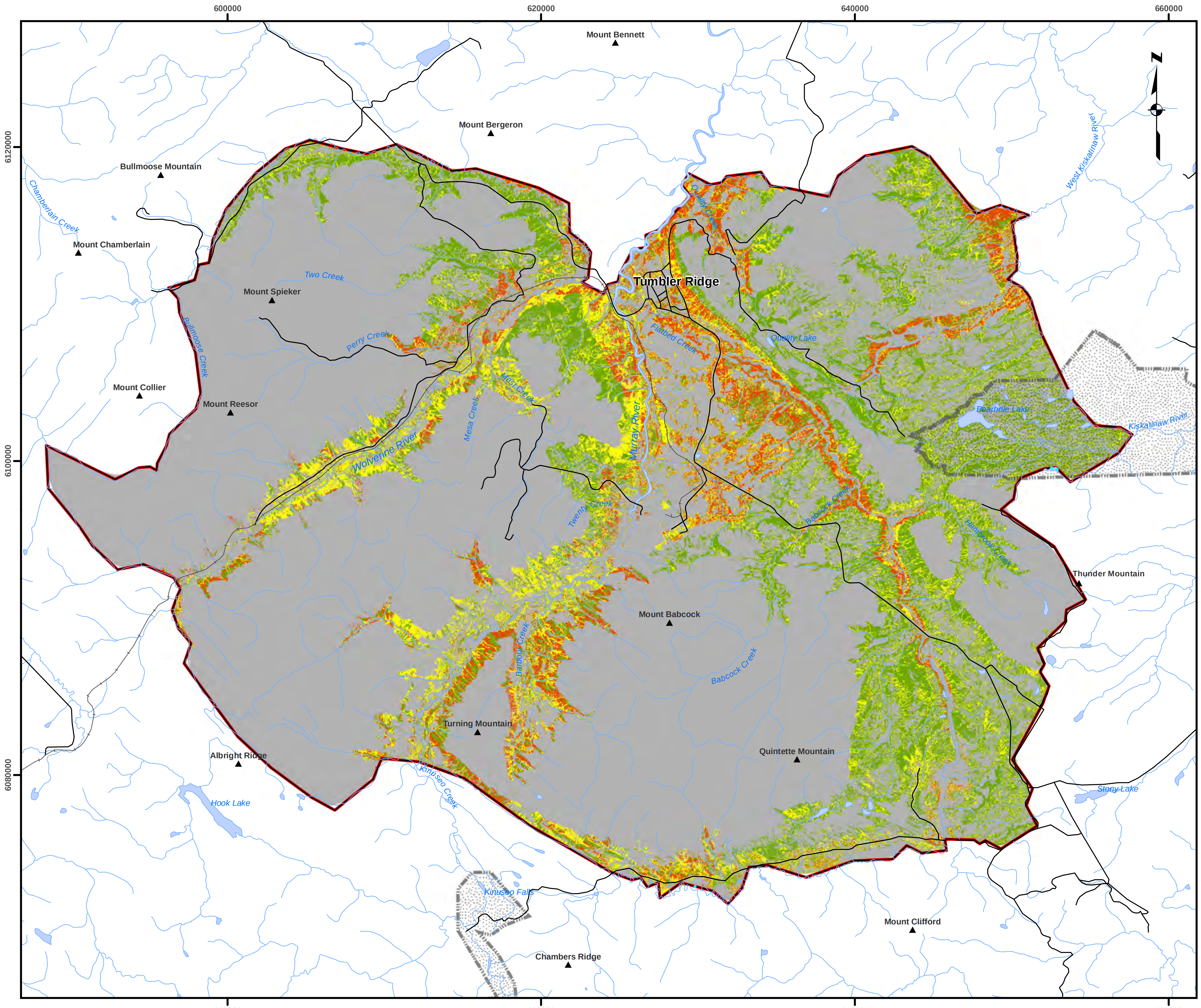
Woodland Caribou, Bearhole/Redwillow Herd, Growing Season Living Habitat Suitability

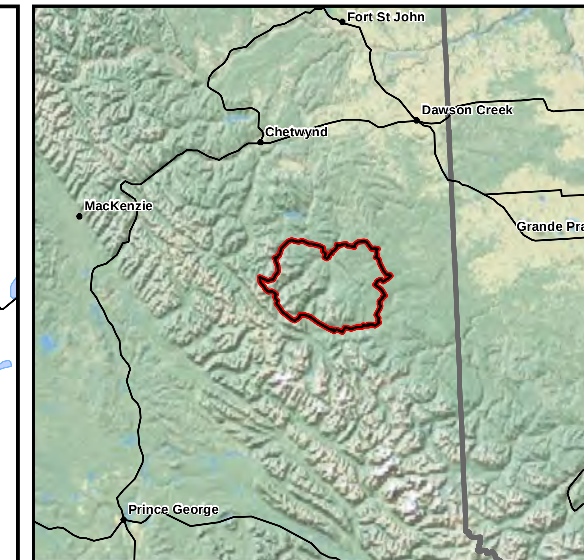
Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-28	Data Sources: Refer to References Section

EDI



600000
620000
640000
660000
6120000
6100000
6080000
Mount Bennett
Mount Bergeron
Bullmoose Mountain
Chamberlain Creek
Mount Chamberlain
Two Creek
Mount Spieker
Bullmoose Creek
Perry Creek
Mount Collier
Mount Reesor
Wolverine River
Mesa Creek
Mast Creek
Murray River
Quality Creek
Tumbler Ridge
Flatbed Creek
Quality Lake
Bearhole Lake
Kiskatinaw River
West Kiskatinaw River
Twenty Creek
Babcock Creek
Hambrook Creek
Thunder Mountain
Mount Babcock
Barbour Creek
Turning Mountain
Albright Ridge
Quintette Mountain
Kinuseo Creek
Hook Lake
Stony Lake
Kinuseo Falls
Mount Clifford
Chambers Ridge
Fort St John
Dawson Creek
Chetwynd
MacKenzie
Grande Prairie
Prince George
LEGEND
Regional Study Area
Habitat Suitability Rating
High
Moderately High
Moderate
Low
Very Low
Nil
Parks and Protected Areas
250K National Topographic Database Data
Mountains
Railway
Road
Stream
Waterbody
0 2.5 5 10 Kilometers
Scale: 1:250,000
Original Map Size 11x17in
Murray River Project
Wildlife Habitat Ratings
Woodland Caribou, Bearhole/Redwillow Herd, Birthing Habitat Suitability
Drawn: D. Weber
Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton
EDI Project No.: 12-V-0073
Date: 2012-03-28
Data Sources: Refer to References Section
EDI





LEGEND

Regional Study Area

Habitat Suitability Rating
- High
- Moderate
- Low
- Nil

Parks and Protected Areas

250K National Topographic Database Data
- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Black-throated Green Warbler
Reproducing Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-27	Data Sources: Refer to References Section

EDI

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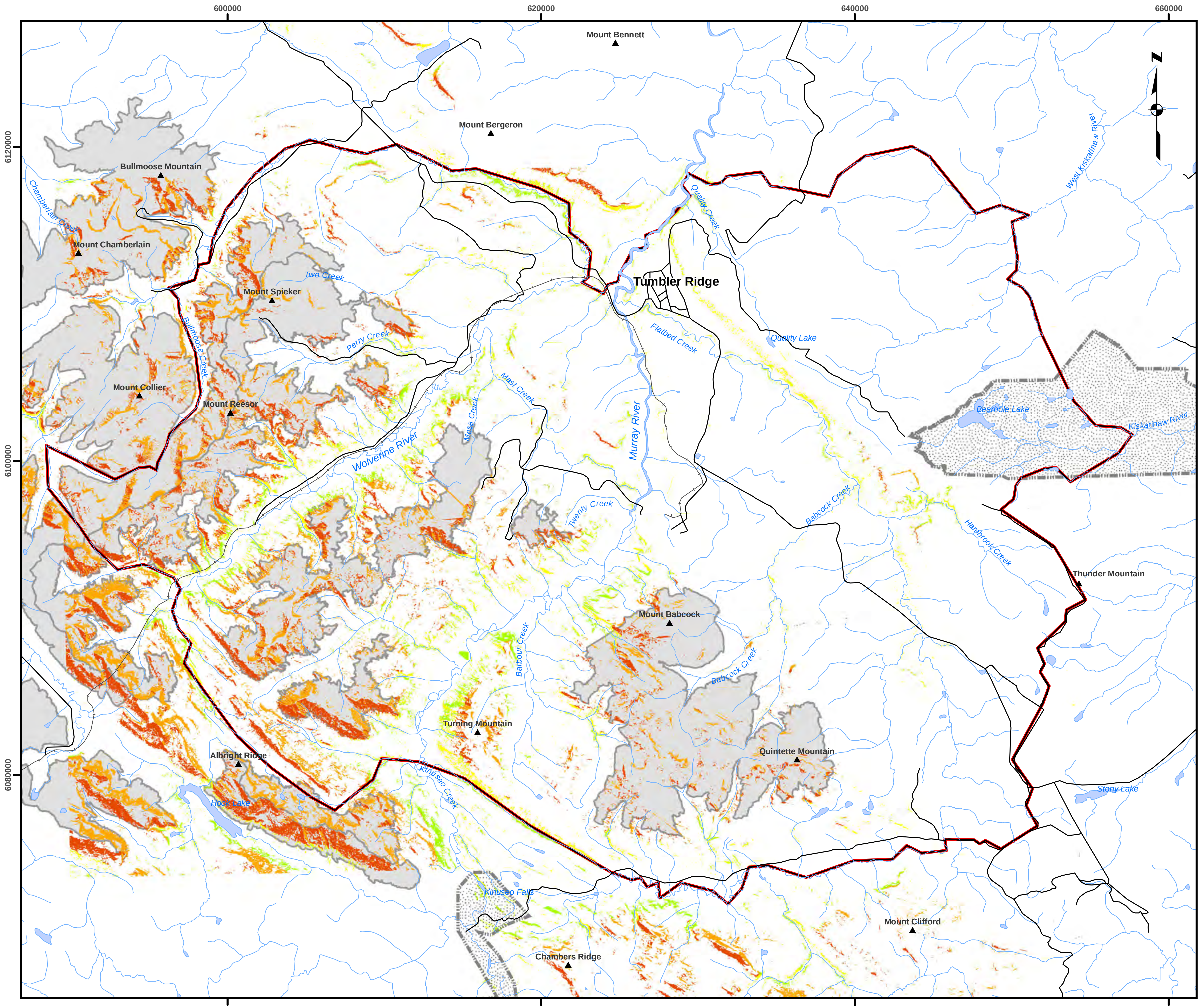

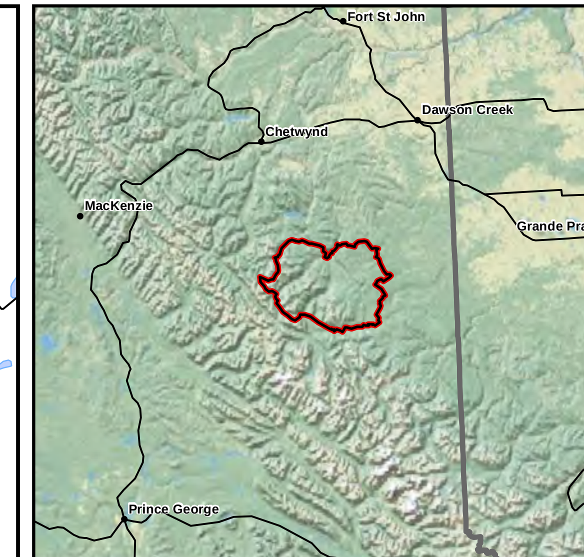

LEGEND

Regional Study Area

Habitat Suitability Rating
- High
- Moderately High
- Moderate
- Low
- Very Low/ NIL

Parks and Protected Areas

Ungulate Winter Range
- Mountain Goat Areas

250K National Topographic Database Data
- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Mountain Goat Winter Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-04-02	Data Sources: Refer to References Section

EDI

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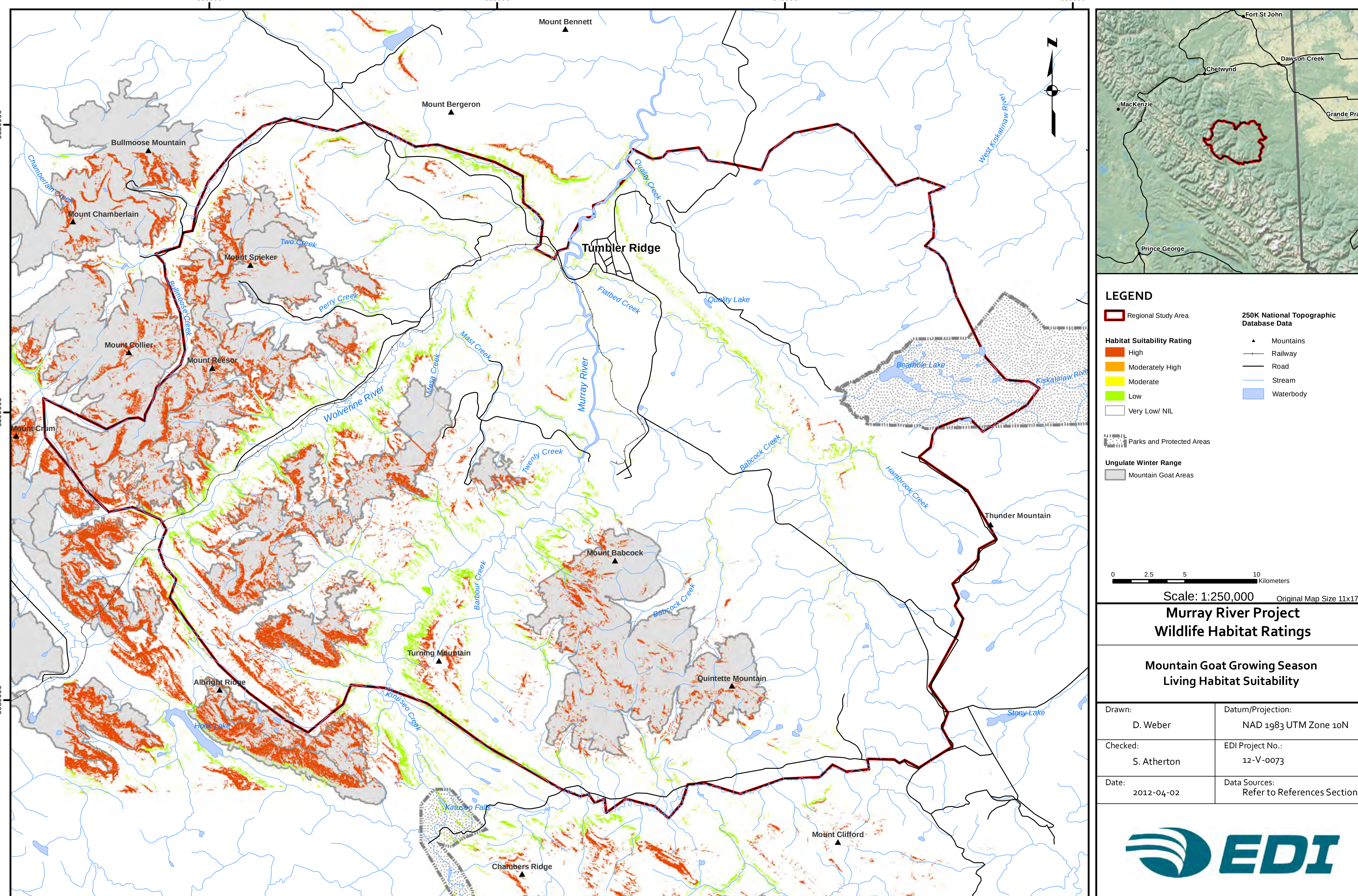

LEGEND

Regional Study Area

Habitat Suitability Rating
- High
- Moderately High
- Moderate
- Low
- Very Low/ NIL

Parks and Protected Areas

Ungulate Winter Range
- Mountain Goat Areas

250K National Topographic Database Data
- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Mountain Goat Growing Season Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-04-02	Data Sources: Refer to References Section

EDI

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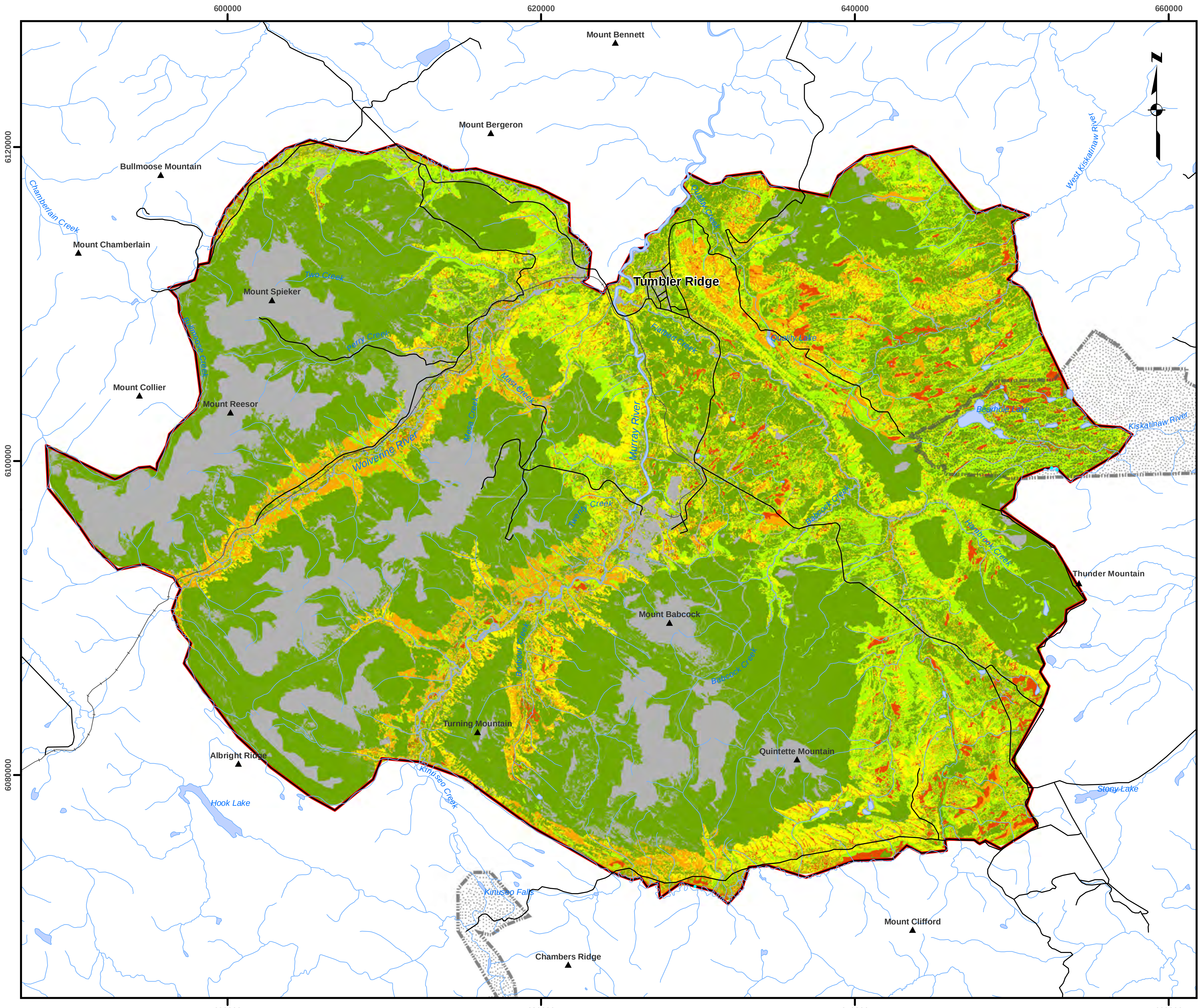

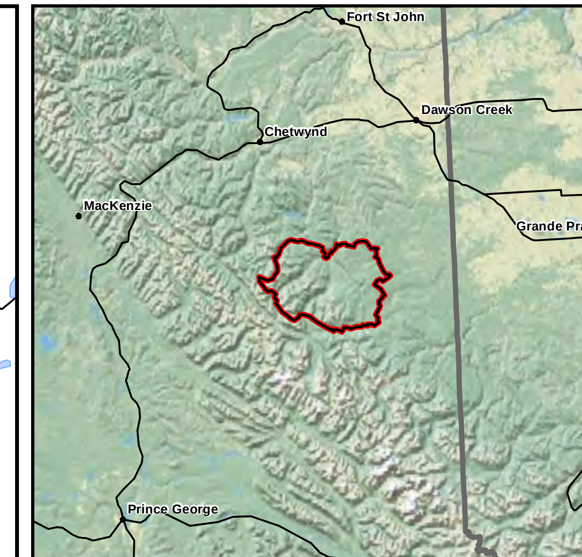

LEGEND

- Regional Study Area

Habitat Suitability Rating
- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

250K National Topographic Database Data
- Mountains
- Railway
- Road
- Stream
- Waterbody

- Parks and Protected Areas

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Moose Winter Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-27	Data Sources: Refer to References Section

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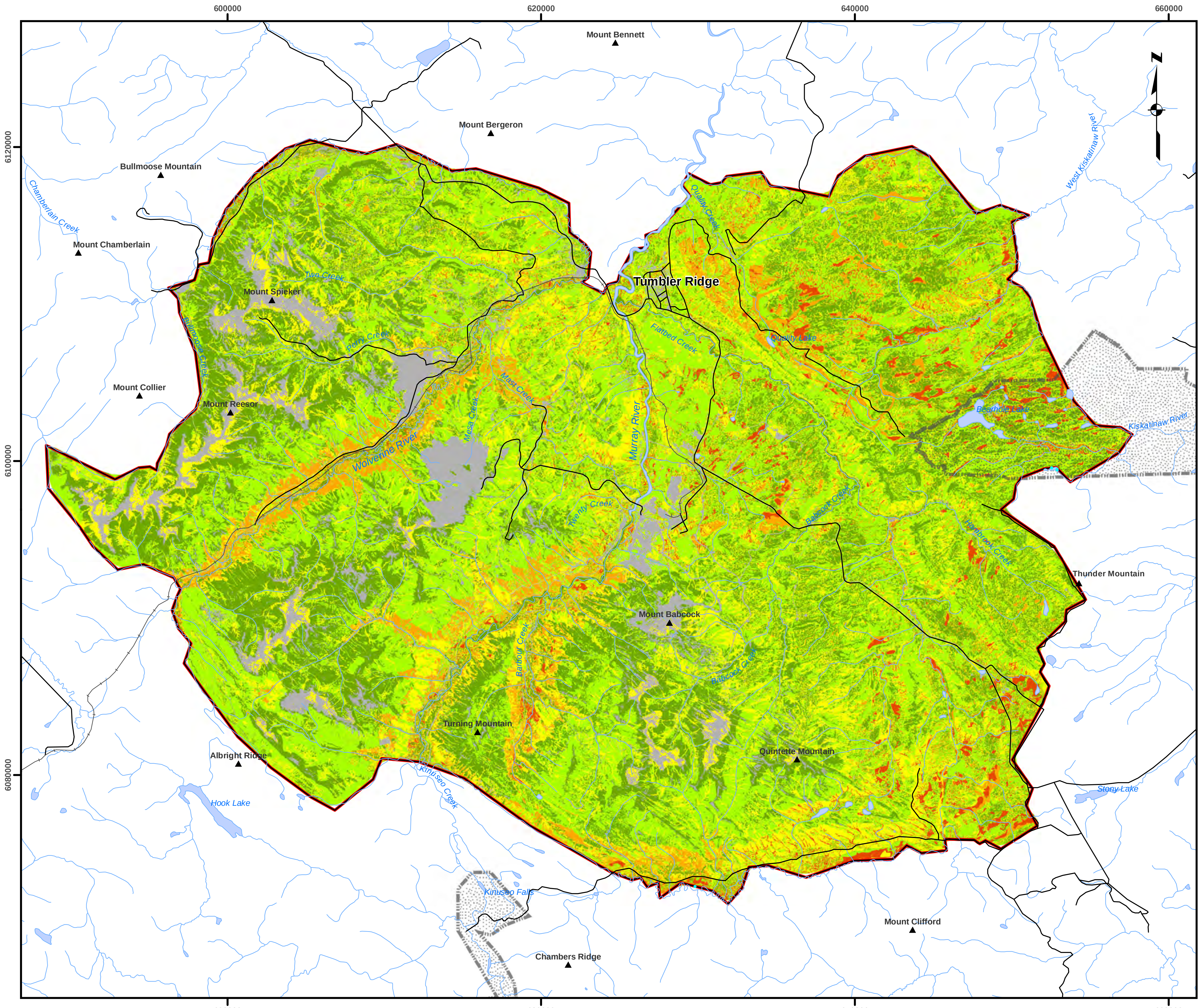

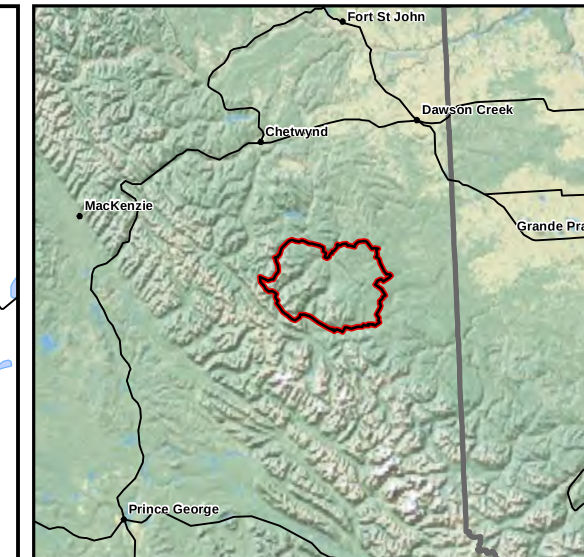

LEGEND

Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

Parks and Protected Areas

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Moose Growing Season Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-27	Data Sources: Refer to References Section

EDI

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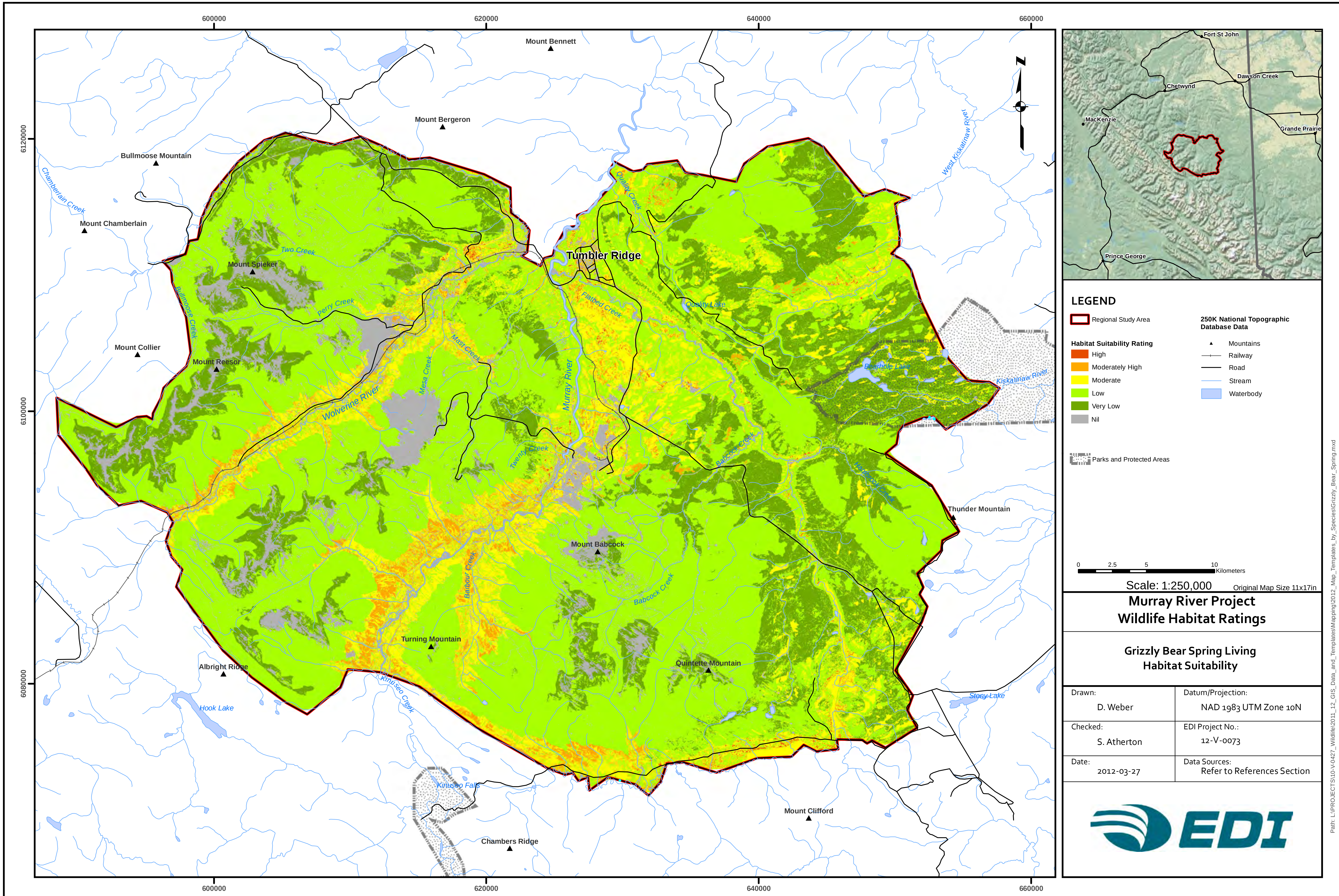

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6080000
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Mount Bergeron
Bullmoose Mountain
Chamberlain Creek
Mount Chamberlain
Two Creek
Mount Spieker
Tumbler Ridge
Quality Creek
Flatbed Creek
Quality Lake
West Kiskatinaw River
Perry Creek
Bullmoose Creek
Mount Collier
Mount Reesor
Mast Creek
Mesa Creek
Murray River
Wolverine River
Bearhole Lake
Kiskatinaw River
Twenty Creek
Babcock Creek
Thunder Mountain
Mount Babcock
Barbour Creek
Babcock Creek
Turning Mountain
Albright Ridge
Quintette Mountain
Hook Lake
Kinuseo Creek
Stony Lake
Kinuseo Falls
Mount Clifford
Chambers Ridge
N
Fort St John
Dawson Creek
Chetwynd
MacKenzie
Grande Prairie
Prince George
LEGEND
Regional Study Area
Habitat Suitability Rating
High
Moderately High
Moderate
Low
Very Low
Nil
250K National Topographic Database Data
Mountains
Railway
Road
Stream
Waterbody
Parks and Protected Areas
0 2.5 5 10 Kilometers
Scale: 1:250,000
Original Map Size 11x17in
Murray River Project
Wildlife Habitat Ratings
Grizzly Bear Spring Living
Habitat Suitability
Drawn:
D. Weber
Datum/Projection:
NAD 1983 UTM Zone 10N
Checked:
S. Atherton
EDI Project No.:
12-V-0073
Date:
2012-03-27
Data Sources:
Refer to References Section
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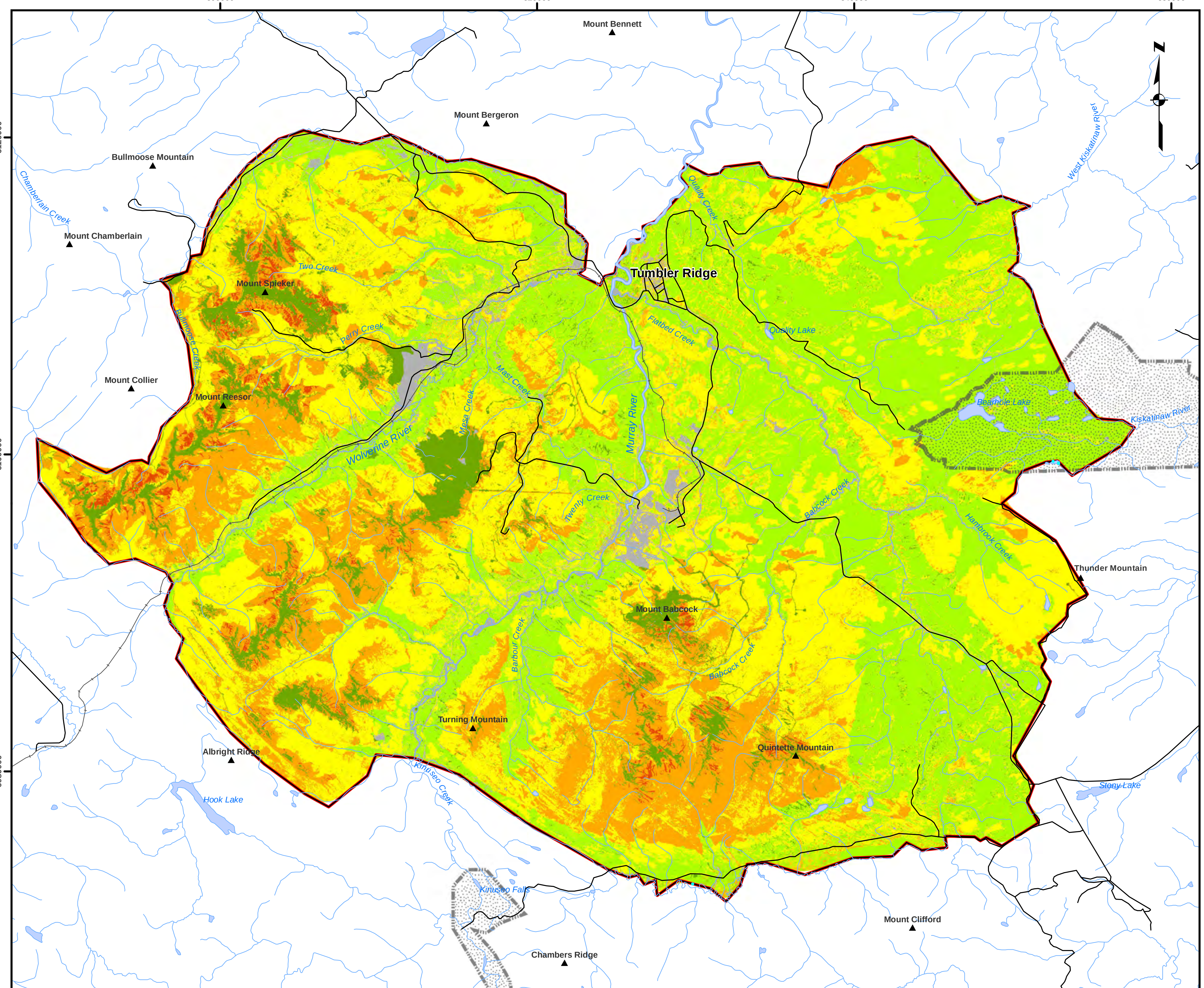

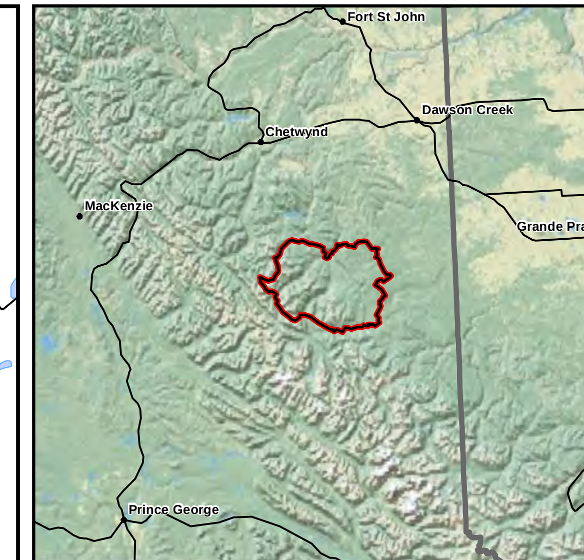

LEGEND

Regional Study Area

Habitat Suitability Rating
- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

250K National Topographic Database Data
- Mountains
- Railway
- Road
- Stream
- Waterbody

Parks and Protected Areas

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project Wildlife Habitat Ratings

Grizzly Bear Summer Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-27	Data Sources: Refer to References Section

EDI

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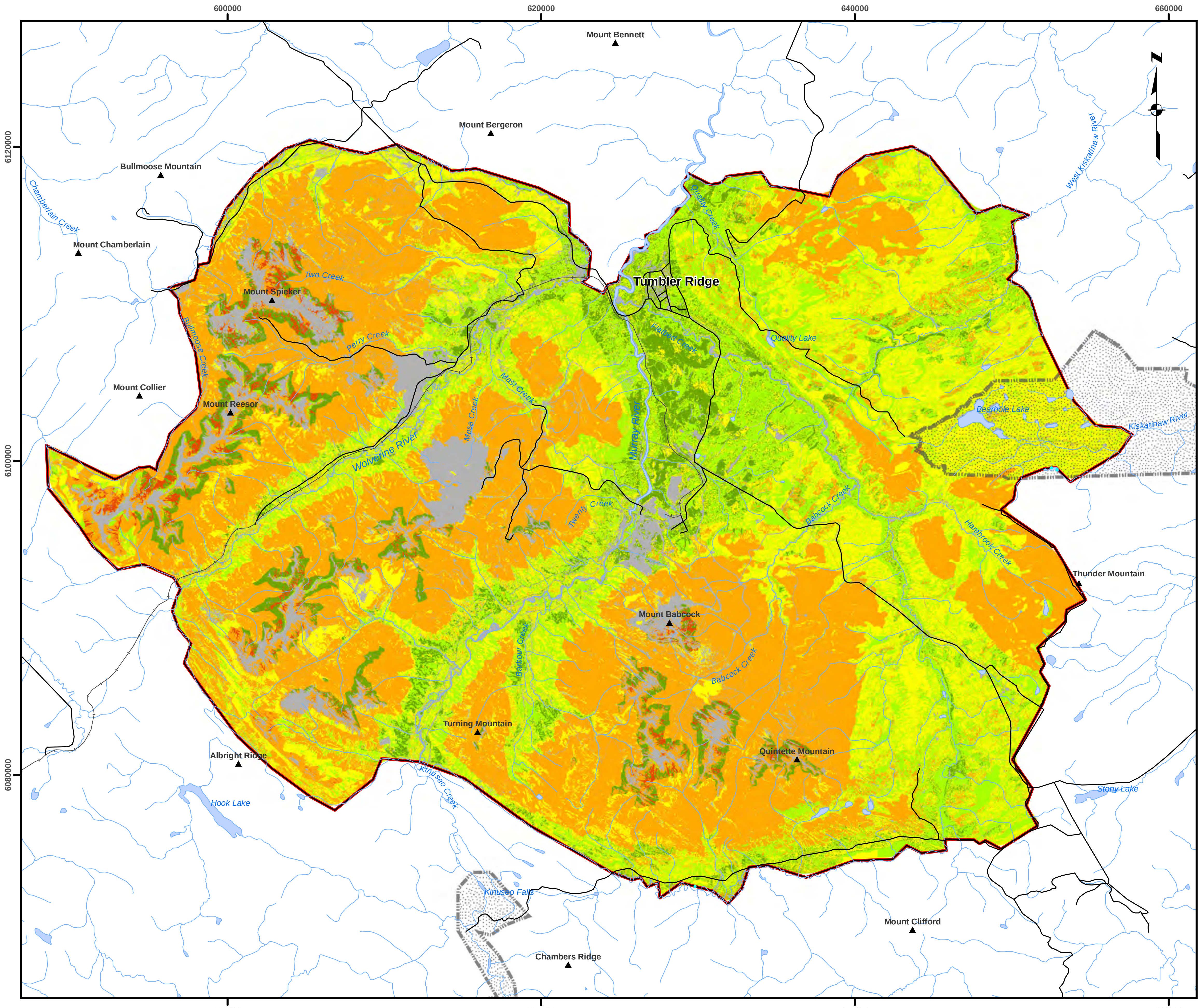

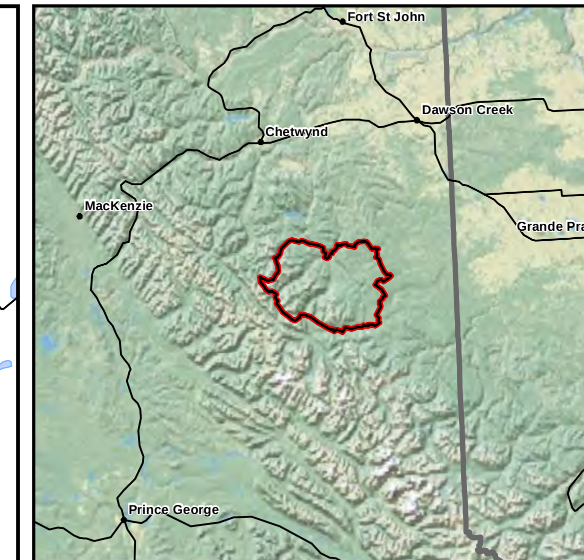

LEGEND

Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

Parks and Protected Areas

0 2.5 5 10 Kilometers

Scale: 1:250,000

Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Grizzly Bear Fall Living Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-27	Data Sources: Refer to References Section

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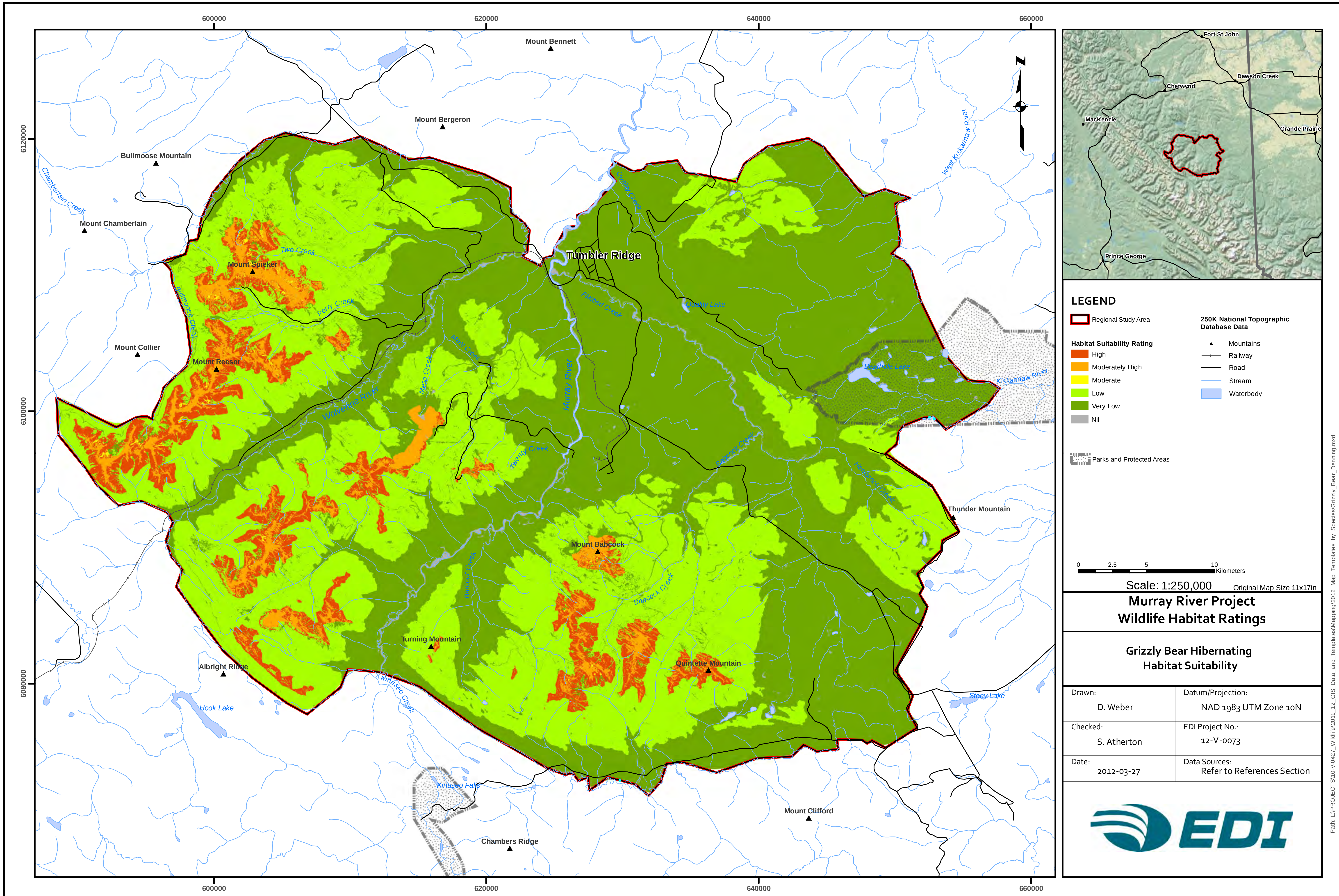

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Mount Bennett
Mount Bergeron
Bullmoose Mountain
Chamberlain Creek
Mount Chamberlain
Two Creek
Mount Spieker
Perry Creek
Bullmoose Creek
Mount Collier
Mount Reesor
Wolverine River
Mesa Creek
Mast Creek
Murray River
Twenty Creek
Tumbler Ridge
Quality Creek
Flatbed Creek
Quality Lake
Bearhole Lake
Kiskatinaw River
West Kiskatinaw River
Babcock Creek
Hambrook Creek
Thunder Mountain
Mount Babcock
Barbour Creek
Turning Mountain
Albright Ridge
Hook Lake
Kinuseo Creek
Kinuseo Falls
Quintette Mountain
Stony Lake
Mount Clifford
Chambers Ridge
Fort St John
Dawson Creek
Chetwynd
MacKenzie
Grande Prairie
Prince George
LEGEND
Regional Study Area
Habitat Suitability Rating
High
Moderately High
Moderate
Low
Very Low
Nil
Parks and Protected Areas
250K National Topographic Database Data
Mountains
Railway
Road
Stream
Waterbody
0 2.5 5 10 Kilometers
Scale: 1:250,000
Original Map Size 11x17in
Murray River Project
Wildlife Habitat Ratings
Grizzly Bear Hibernating
Habitat Suitability
Drawn:
D. Weber
Datum/Projection:
NAD 1983 UTM Zone 10N
Checked:
S. Atherton
EDI Project No.:
12-V-0073
Date:
2012-03-27
Data Sources:
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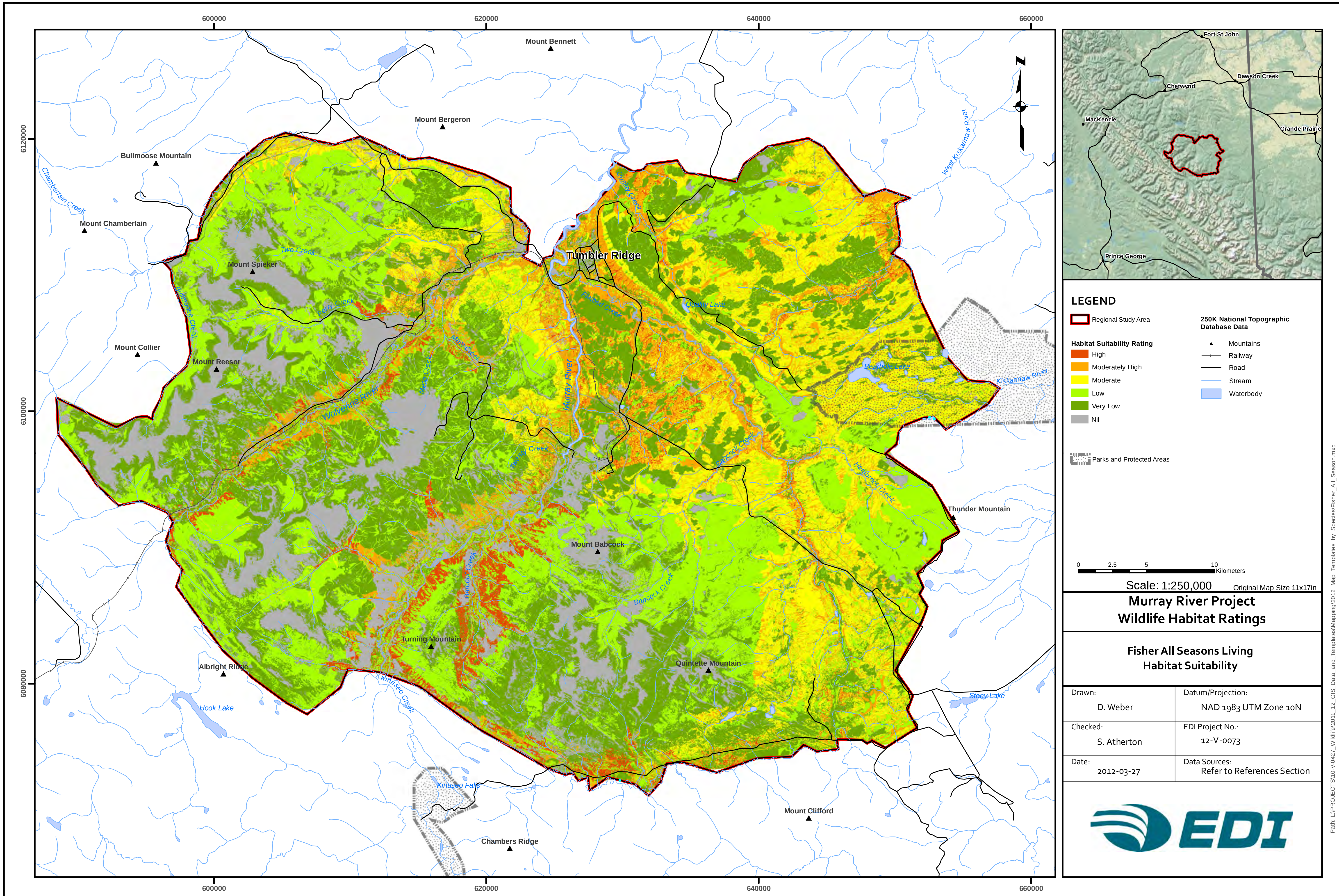

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Mount Chamberlain
Two Creek
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Mount Collier
Mount Reesor
Wolverine River
Murray River
Tumbler Ridge
Quality Creek
Flatbed Creek
Quality Lake
Bearhole Lake
Kiskatinaw River
West Kiskatinaw River
Babcock Creek
Hambrook Creek
Thunder Mountain
Mount Babcock
Bairnes Creek
Turning Mountain
Quintette Mountain
Albright Ridge
Hook Lake
Kinuseo Creek
Kinuseo Falls
Chambers Ridge
Mount Clifford
Stony Lake
Fort St John
Dawson Creek
Chetwynd
MacKenzie
Grande Prairie
Prince George
LEGEND
Regional Study Area
Habitat Suitability Rating
High
Moderately High
Moderate
Low
Very Low
Nil
Parks and Protected Areas
250K National Topographic Database Data
Mountains
Railway
Road
Stream
Waterbody
0 2.5 5 10 Kilometers
Scale: 1:250,000
Original Map Size 11x17in
Murray River Project
Wildlife Habitat Ratings
Fisher All Seasons Living
Habitat Suitability
Drawn:
D. Weber
Datum/Projection:
NAD 1983 UTM Zone 10N
Checked:
S. Atherton
EDI Project No.:
12-V-0073
Date:
2012-03-27
Data Sources:
Refer to References Section
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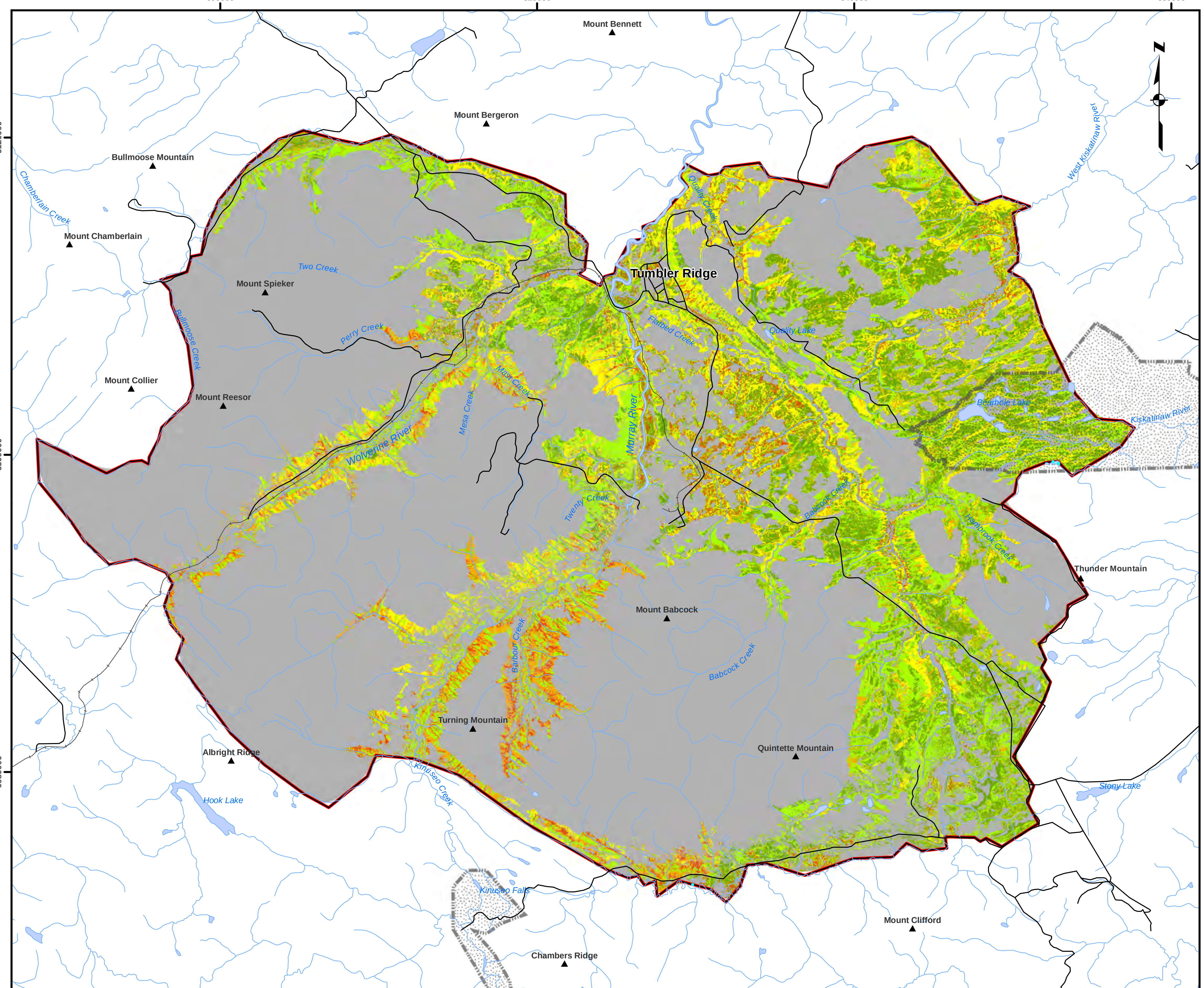

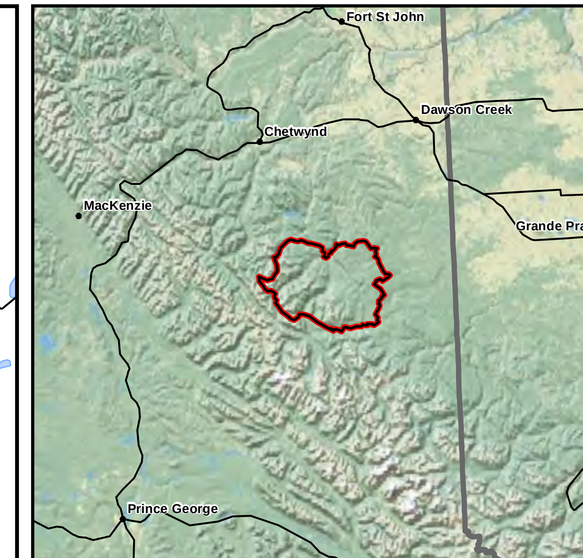

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Regional Study Area

Habitat Suitability Rating

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

Parks and Protected Areas

250K National Topographic Database Data

- Mountains
- Railway
- Road
- Stream
- Waterbody

0 2.5 5 10 Kilometers

Scale: 1:250,000 Original Map Size 11x17in

Murray River Project
Wildlife Habitat Ratings

Fisher Birthing
Habitat Suitability

Drawn: D. Weber	Datum/Projection: NAD 1983 UTM Zone 10N
Checked: S. Atherton	EDI Project No.: 12-V-0073
Date: 2012-03-27	Data Sources: Refer to References Section

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