Series Introduction
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A conservation ecoregional assessment for the British Columbia Central Interior

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Abstract

Ecoregional assessments provide a regional scale, biodiversity-based context for implementing conservation efforts by identifying a portfolio of sites for conservation action with a goal of protecting representative biodiversity and ecologically significant populations. The intent of these assessments is to create a shared vision for agencies and other organizations at the regional, state, and local levels to form partnerships and to ensure efficient allocation of conservation resources. The Nature Conservancy of Canada recently completed an ecoregional assessment of British Columbia's Central Interior, the main components of which are presented as articles in this special issue of the *BC Journal of Ecosystems and Management*. These components include terrestrial ecosystems and animals, and freshwater ecosystems and species. The assessment also incorporates some new and innovative approaches to considering conservation priorities along with climate change, ecosystem services, and wildlife habitat modelling.

The Central Interior Ecoregional Assessment provides a guide for prioritizing work on the conservation of habitats that support the extraordinary biological diversity of the ecoregion. Issues associated with land use and resource management planning are incredibly complex and this complexity is accelerating as a result of a changing climate and the cumulative effects of human impacts on species and ecosystems. The methods and results described in the following articles reflect the growing body of conservation planning experience.

KEYWORDS: *biodiversity; British Columbia; Central Interior Ecoregional Assessment; climate change; conservation planning; Nature Conservancy of Canada.*

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Introduction

Ecoregional assessments provide a regional scale, biodiversity-based context for implementing conservation efforts. The intent of these assessments is to create a shared vision for agencies and other organizations at the regional, state, and local levels to form partnerships and to ensure efficient allocation of conservation resources. The assessments identify a portfolio of sites for conservation action with a goal of protecting representative biodiversity and ecologically significant populations. The Nature Conservancy of Canada's British Columbia region has completed eight ecoregional assessments, many in collaboration with the United States-based Nature Conservancy, which first developed this methodology (Groves et al. 2000, 2002; Groves 2003). These assessments are the result of rigorous analysis, incorporate expert review, and are the most comprehensive and current efforts to support spatially explicit priority setting at an ecoregional scale. The Nature Conservancy of Canada recently completed the Central Interior Ecoregional Assessment that integrates the main components of an ecoregional assessment, which are described as articles in this issue including

- terrestrial ecosystems (G.M. Kittel et al. 2011a, see pages 54–71),
- terrestrial animals (Horn 2011, see pages 36–53), and
- freshwater ecosystems and species (Howard and Carver 2011, see pages 72–87).

This assessment also incorporates some innovative approaches to considering conservation priorities along with climate change (T.G.F. Kittel et al. 2011b, see pages 7–35; Rose and Burton 2011, see pages 101–117), ecosystem services (Chan et al. 2011, see pages 98–100), and wildlife habitat modelling (McNay et al. 2011, see pages 118–135; Nielsen 2011, see pages 136–147).

The goal of the assessment is to identify a suite of conservation areas in which the long-term survival of all native plant and animal species and natural communities in the Central Interior ecoregion can be maintained. Assessment products include

- terrestrial and freshwater portfolios of priority conservation areas and watersheds that show places of exceptional biological value and (or) the most likely places for conservation to succeed based on current condition or status;
- maps depicting the relative irreplaceability of all sites across the entire ecoregion; and
- the conservation value of all assessment units or watersheds, depicting a wide range of options for biodiversity conservation.

The goal of the assessment is to identify a suite of conservation areas in which the long-term survival of all native plant and animal species and natural communities in the Central Interior ecoregion can be maintained.

We recognize that to undertake conservation within all portfolio sites is a challenge necessitating collaboration. Biodiversity conservation in the ecoregion will only reach full potential if conservation organizations, First Nations and other governments, and industry co-ordinate their strategies to protect and restore biodiversity according to the priorities identified in this process.

Central Interior ecoregion description

The Central Interior ecoregion boundary encompasses the Sub-Boreal Interior and Central Interior ecoprovinces (Figure 1). This ecoregion covers approximately 25.7 million ha, or approximately 63 million acres, and includes the flat-to-rolling Chilcotin, Cariboo, Nechako, and McGregor plateaus; the Chilcotin, Bulkley, Tahtsa, and Hart ranges; and the Omineca and Skeena mountains. The ecoregion has a unique combination of topography and climate. It consists of a large interior plateau that grades into more hilly country in the north. In the south, the plateaus are underlain by the lava forms of coastal volcanoes.

The ecoregion is influenced by both coastal and interior climates. It lies in a rainshadow to the east of the Coast Mountains and has a typical continental climate—cold winters with outbreaks of Arctic air from boreal forests to the north. The ecoregion helps form part of the largest intact forested ecosystem in the world (A. Harcombe, Nature Conservancy of Canada, pers. comm., May 2010). Vegetation is dominated by Sub-boreal Spruce and Interior Douglas-fir biogeoclimatic zone ecosystems. Vegetation communities are diverse in response to variation in elevation and other conditions. The ecoregion is nourished by the waters of the Skeena, Dean, and Nass rivers, and it contains the headwaters of the Fraser River.

FIGURE 1. Central Interior ecoregion terrestrial and freshwater study areas.

This area supports both anadromous and freshwater fish including chinook salmon (*Oncorhynchus tshawytscha*), sockeye salmon (*Oncorhynchus nerka*), steelhead trout (*Oncorhynchus mykiss*), Pacific lamprey (*Lampetra tridentata*), both native and introduced populations of rainbow trout (*Oncorhynchus mykiss*), Dolly Varden (*Salvelinus malma*), and the endangered white sturgeon (*Acipenser transmontanus*).

Numerous wetlands provide important waterfowl nesting habitats for migratory birds. The ecoregion supports 65% of all bird species known to occur in British Columbia, and 61% of all bird species known to breed in the province (Demarchi 1996). The only breeding colony of the American White Pelican (*Pelecanus erythrorhynchos*) in the province is found on the Chilcotin Plateau, and the world centre of breeding abundance for the Barrow's Goldeneye (*Bucephala islandica*) is in this ecoregion (Demarchi 1996). It is also the centre of breeding abundance in British Columbia for the Greater Yellowlegs (*Tringa melanoleuca*) and Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*), and is one of two important breeding areas for the Long-billed Curlew (*Numenius americanus*) and the Ring-billed Gull (*Larus delawarensis*) (Demarchi 1996). Here, too, are found the highest breeding numbers in the province of the Herring Gull (*Larus argentatus*) and the Black Tern (*Chlidonias niger*). Moose (*Alces americanus*) are the most widespread ungulate, but there are also populations of mule deer (*Odocoileus hemionus*) and California bighorn sheep (*Ovis canadensis californiana*) (Demarchi 1996).

The grizzly bear (*Ursus arctos horribilis*), black bear (*Ursus americanus*), gray wolf (*Canis lupus*), cougar (*Felis concolor*), and coyote (*Canis latrans*) are common in the ecoregion (Demarchi 1996). The western terrestrial garter snake (*Thamnophis elegans*), the common garter snake (*Thamnophis sirtalis*), the rubber boa (*Charina bottae*), the western toad (*Bufo boreas*), and the Columbia spotted frog (*Rana luteiventris*) are also found in the Central Interior ecoregion (Demarchi 1996).

The immense landscape of the Central Interior ecoregion overlaps the administrative boundaries of a number of regional districts, including the Cariboo, Bulkley-Nechako, Peace River, Stikine, Kitimat-Stikine, and Fraser–Fort George and, to a lesser degree, Central Coast, Squamish-Lillooet, Mount Waddington, and Thompson-Nicola (BC Stats 2006). Major population centres in the Cariboo Regional District are Quesnel and Williams Lake, with a district population of 65 471 according to 2010 population estimates (BC Stats 2011). Forestry is the main economic driver for the area, but cattle ranching, mining, and tourism also play important roles in the economy (BC Stats 2007a). Another large regional district within the study area is the Fraser–Fort George Regional District, with a population estimate of 96 575 in 2010 (BC Stats 2011). The main population centre is the city of Prince George, which had a population of 75 568 in 2010 (BC Stats 2011). The principal economic driver in this regional district is forestry, with tourism playing a smaller but still important role (BC Stats 2007b).

Approximately 12%, or 2 452 191 ha, of the ecoregion is currently protected (see Map 3 from Nature Conservancy of Canada, 2010). The major provincial protected areas found in the ecoregion are Tweedsmuir (approximately 981 000 ha), Ts'yl-os (233 000 ha), Entiako (122 529 ha), Itcha Ilgachuz (112 000 ha), and Big Creek (65 982 ha).

Assessment methods

This assessment uses an approach developed by The Nature Conservancy (Groves et al. 2000, 2002; Groves 2003) and other scientists to establish conservation priorities within the natural boundaries of ecoregions. Similar assessments have been competed for 14 ecoregions in Canada and over 45 of the 81 ecoregions in the United States, and several other ecoregions around the world.

Ten technical teams collaborated on a series of analyses. Three teams covered the terrestrial environment's plants, animals, and ecological systems. A fourth team studied the ecoregion's freshwater ecosystems and species. The fifth team assessed human impacts to biodiversity in the region, and the sixth team focussed on geographic information systems and data management. The seventh and eighth teams were tasked with incorporating climate change and ecosystem services, respectively. The final two teams dealt with developing the decision-support tool/regional atlas and co-ordinating the overall conservation planning process.

The terrestrial and freshwater teams began by selecting the species, communities, and ecological systems that would serve as the conservation targets. Conservation targets are those elements that are determined by the teams to be representative of the biodiversity of the study area. A computer program (Marxan) was used to select a network of conservation areas that met the goals for target species and habitat types at the lowest "cost" using a suite of economic, social, and environmental factors. Cost was minimized by selecting the sites rated as most suitable for long-term conservation. Site suitability was described using an index of existing land management status, land uses, urban proximity, and road density. Marxan compared each part of the ecoregion against all others and analyzed millions of possible site combinations to select the most efficient portfolio. Separate portfolios were created for terrestrial and freshwater biodiversity. Marxan outputs were also used to generate maps that rated the conservation value and depicted the relative irreplaceability of all sites across the ecoregion.

The technical teams worked with the Marxan outputs to refine both the terrestrial and freshwater portfolios based on expert review. Sites in both portfolios were prioritized for action based on the conservation and suitability values encompassed by each site. These portfolios highlight areas of high conservation value for terrestrial and freshwater species and systems. The terrestrial and freshwater portfolios were then overlaid to demonstrate areas of overlap.

Using the assessment

The Central Interior Ecoregional Assessment is a guide for natural resource planners and others who are interested in the status or conservation of the biological diversity of this ecoregion. This assessment has no regulatory authority; it is simply a guide for prioritizing work on the conservation of habitats that support the extraordinary biological diversity of the ecoregion. It provides a tool that should be used in conjunction with other biological information, particularly at more local scales, as well as with information about social and economic priorities.

Decision-support tool

The Central Interior Ecoregional Assessment presented an opportunity to develop a decision-support tool. We held several workshops and information-gathering sessions within the Central Interior ecoregion as well as with collaborators in Victoria and Vancouver. One of the key messages we heard was of the need for data sets to be more easily accessible because these sets are often held by different agencies and in different formats. We heard that it is also very important for these data sets to be current, possibly linked to data update cycles from the source. A need was also expressed for simple query capabilities that would be available online on any computer (no special software needed).

The Nature Conservancy of Canada previously partnered in the development of HectaresBC (***http://www.hectaresbc.org***), so we were aware of this application and began talking with the developers about adding additional functionality. One of the important changes we needed was the ability to frame queries based on watersheds and not just hectares or other artificial boundaries like those of regional districts. This was accomplished along with some other changes and additions of our data and results (ongoing). Working with HectaresBC enables us to take advantage of the hundreds of data layers already available in the application, allowing users to see our data and results within a familiar context. Not only is there an increased availability to data, there is the ability to ask simple questions of the data with very fast results. We hope that our results can be used within the HectaresBC decision-support tool to help provide information and assist decision makers with issues related to:

- the mountain pine beetle outbreak and decisions on salvage areas;
- climate change;
- increases in allowable annual cut;
- unprecedented ecological and socio-economic impacts;
- opportunities to engage governments (federal, provincial, First Nations) and stakeholders, such as industry and communities, in making decisions for forestry, other land uses, and economic activities; and
- the need for a decision-support tool to engage people in making collective decisions around land use from an ecosystem management perspective.

As a potential example, the current mountain pine beetle (*Dendroctonus ponderosae* Hopkins) infestation in British Columbia is the result of a combination of factors that include climate change, conversion and fragmentation of natural habitats, and disruption of natural ecological processes in both terrestrial and aquatic communities. It is predicted that this outbreak will kill 80–95% of mature lodgepole pine (*Pinus contorta* var. *latifolia* Dougl.) in the province. Currently, and into the future, this will have profound effects on wildlife and wildlife habitats. It will put forest values at risk and threaten the stability and long-term economic well-being of many communities. It also presents a major challenge to planners and policy-makers. To be sustainable, their decisions about land use and resource management will need to integrate information about the ecology of ecosystem disturbance, the role of climate and climate change, the effects of forest harvesting, the values and environmental services that forest ecosystems provide to human society, and the relationships between human communities and forests (Kimmins et al. 2005). Technological developments, such as the HectaresBC application, have opened up possibilities for managing and analyzing information and assessing future scenarios. In turn, improved data integration and modelling capabilities provide an opportunity to support new and innovative governance models. These can improve integration and collaboration in planning and in implementing effective land use and resource management decisions (A. Tautz, B.C. Ministry of Environment, pers. comm., April 2008).

Conclusion

The issues associated with land use and resource management planning are incredibly complex and this complexity is accelerating as a result of a changing climate and the cumulative effects of human impacts on species and ecosystems. The methods and results described in the following articles reflect the growing body of conservation planning experience. We appreciate the commitment of our many collaborators and look forward to working with many of them in implementing this conservation plan.

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