Transboundary Collaborative Solutions to Ecosystem Management at the Landscape Scale

This article was contributed by Erin Sexton, Flathead Lake Biological Station - University of Montana and Tracy Timmins, Geography Department - University of Calgary.
Visit Crown Managers Partnership for more information about their work. Products from the GNLCC-supported work will be available on the Landscape Conservation Management and Analysis Portal.

Project partners: Crown Managers Partnership; Alberta Ministry of Environment and Sustainable Resource Development; Alberta Tourism, Parks and Recreation; Parks Canada; British Columbia Ministry of Environment; US Forest Service; National Park Service - Rocky Mountain Inventory and Monitoring Network; Montana Department of Natural Resources and Conservation; Flathead Basin Commission; University of Calgary; University of Montana - Flathead Lake Biological Station; British Columbia Ministry of Forests, Lands and Natural Resource Operations; Dr Guillermo Castilla, Alberta Biodiversity Monitoring Institute; Gordon Stenhouse, Foothills Research Institute - Grizzly Bear Research Program; and Dr Clint Muhlfeld, US Geological Survey. Website link to this report is:

http://greatnorthernlcc.org/features/crown-managers

The Crown Managers Partnership (CMP) is a diverse group of science and resource management agencies who voluntarily come together to provide leadership in addressing environmental management issues across the Crown of the Continent Ecosystem (CCE). Originating in 2001, the Partnership includes federal, state, provincial agency, tribes and First Nations managers from Alberta, British Columbia, and Montana.

Given that no single agency has the mandate or resources to focus on the entire region, the CMP seeks to demonstrate a common, collective institutional capacity across borders to effectively manage the cumulative impacts of human activities and land use practices on this entire interconnected landscape. Our strength is in our capacity to act as integrators through a strong, established network of international managers.

Crown of the Continent Ecosystem

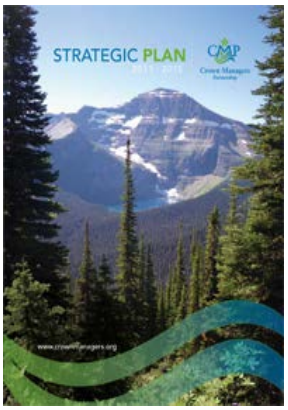
Crown of the Continent Ecosystem covers 18 million acres (7 million hectares) in British Columbia, Alberta, & Montana

Crown of the Continent within the Great Northern LCC

The CCE is a transboundary focal landscape, encompassing the area of highest jurisdictional complexity within the Rocky Mountain ecotypic area of the Great Northern Landscape Conservation Cooperative. The CCE is one of North America's most ecologically diverse and jurisdictionally fragmented landscapes—-it covers the shared Rocky Mountain region of Montana, British Columbia, and Alberta, spreading across two nations, one state, two provinces, and numerous aboriginal lands.

The CCE is internationally recognized for its biodiversity and landscape form, and includes the headwaters of three of North America's major river systems. Ecosystem functioning across the CCE is under pressure from climate change, energy development, and land-use conversions related to increasing levels of human activity.

Managing for Ecological Health—Indicators of Ecological Integrity



The CMP has adopted a five-year Strategic Plan to achieve the vision of an ecologically healthy CCE. This will be accomplished through the management actions of multiple agencies, each exercising their own jurisdiction with common goals in mind. Toward this end, the flagship program of the CMP is the "Managing for Ecological Health" project. The CMP has identified six broad indicators of ecological integrity in the CCE:

- Landscapes
- Water quantity and quality
- Biodiversity
- Invasive species
- Air quality
- Climate.

The CMP is collaborating with university and agency partners to identify the current condition of indicators across the landscape (baseline) and conduct change analysis over time (trend). Our working assumption is that visible land use changes influence most indicators, so significant emphasis is placed on the *landscapes analysis*, augmented by supplemental work on individual indicators.

Great Northern LCC Supports Landscapes Analysis

In 2009, the CMP embarked on a partnership with the University of Calgary - Geography Department, the National Park Service - Rocky Mountain Inventory and Monitoring Network, and the University of Montana - Flathead Lake Biological Station to conduct landscape analysis at the scale of the CCE. The Great Northern LCC began contributing to this effort, and strengthening our collaboration in 2010. Our goals are to:

1. Inventory and integrate transboundary geo-spatial data sets for a suite of landscape metrics
2. Synthesize multi-jurisdictional transboundary data to conduct meaningful analysis of land cover, phenology and human-use footprint across the CCE
3. Establish an accurate representation of baseline ecosystem conditions that is consistent at the scale of the CCE
4. Inventory baseline condition and identify changes to the baseline that reflect shifts in underlying ecological health
5. Test and evaluate the relationship between the Landscape Analysis and the indicators of ecological integrity
6. Share findings on an on-going basis with CMP agencies, collaborators and public and community stakeholders
7. Define standards for landscape metrics and develop transboundary management protocols that incorporate desired outcomes and agreed upon thresholds and trigger points for management action.

The CMP seeks to use this information to address a series of large-scale management priorities including an assessment of habitat connectivity, water resources vulnerability and the status of threatened species, as well as the response of these factors to major ecosystem drivers such as climate change, human development, the spread of invasive species and natural disturbance.

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Waterton-Glacier International Peace Park. Photo courtesy of Bill Dolan

Case Study for Achieving Conservation Delivery Across Complex Jurisdictions

Jurisdictional complexity in the Crown of the Continent Ecosystem

Existing protocols for landscape integrity analysis are informing the Ecological Health project, but the challenges posed by the CCE are unique. Most pressing among these is the presence of the United States-Canada international border, which complicates a variety of issues surrounding data access, acquisition, and meaningful integration.

It is a strategic priority of the CMP to overcome barriers to working collaboratively across boundaries. These include administrative and financial barriers, as well as barriers to data-sharing and data integration. The CMP is working actively to increase data availability amongst partners and collaborators.

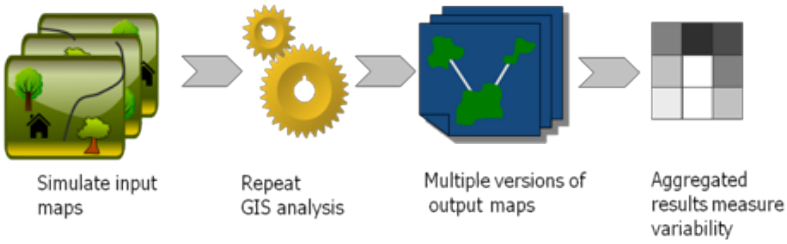
Reports and Products

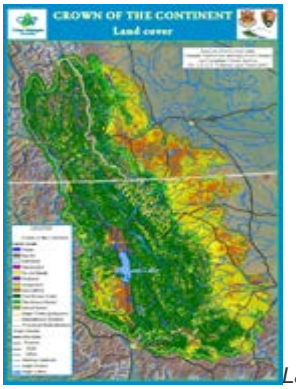
Crown Managers Partnership Landscapes Data-review Report, October 2011
This report is a review of baseline geospatial datasets for the Crown of the Continent Ecosystem Landscape Analysis. The report documents the data-discovery and assessment of GIS datasets for the CCE. In seeking to develop this program, we sought to know what geospatial datasets were free and available for this project prior to initiating potentially costly data acquisitions. The efforts associated with this report contribute to the baseline dataset inventory for the CCE.

NPScape derived maps and statistical tables, November 2010
NPScape is landscape dynamics monitoring program of the National Park Service that produces and delivers to parks a suite of landscape-scale data sets, maps, and analysis to inform resource management and planning at a local, regional, and national scale. NPScape provides the geo-spatial tools to incorporate and analyze information about changes and trends in landscape-scale metrics in and around parks.

Analysis of error propagation using Monte Carlo simulation
In the geo-spatial analysis, this work develops a Monte Carlo simulation framework for conducting quantifying and visualizing the propagation of error and uncertainty from categorical

maps into derived maps. The process of Monte Carlo simulation is shown in the graphic below. Multiple versions of the input map are simulated based on the known error characteristics and used to re-evaluate a spatial model to produce multiple output maps. These can be aggregated to obtain a spatial map of uncertainty.





Land cover in the Crown of the Continent Ecosystem

Baseline data sets

One of our primary objectives is to develop seamless baseline datasets and associated maps, for the CCE. These datasets will be used to assess status and trend at the scale of the Crown, using a baseline year of 2000, with the potential to back-cast and forecast for trend analysis purposes. We have selected a suite of landscape metrics related to land cover, phenology, and human use footprint for this analysis.