Transboundary Collaborative Solutions to Ecosystem Management at the Landscape Scale

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Landscapes Analysis

- A collaborative research project delivering knowledge and information products to managers on indicators of ecological integrity
- A focus on seamless, transboundary datasets spanning the entire CCE
- A flexible foundation capable of supporting a broad range of ecological applications
- A monitoring framework designed to capture changing landscape conditions
Crown Managers Partnership (CMP)

Vision

“An ecologically healthy Crown of the Continent Ecosystem”
Ecological Health Project

- Long-term, multi-faceted project aimed at defining a level of ecological health that can inform agencies’ management;
- Multi-year strategic priority for CMP;
- Establish on indicators-based, environmental outcomes approach
Indicators of Ecological Health

- Landscape
- Biodiversity
- Water quality
- Invasives
- Climate
- Air quality
- Cultural
Managing for Ecological Health

- Directing management
- Setting targets / thresholds
- Examining trends
- Taking stock

Managing to a desired state
Choosing where we want to be
Knowing where we’ve been, where we’re going
Describing the state of the COCE

Defining health
What ‘Health’ means in the COCE
Landscape-scale Trend Analysis

- Synthesize existing datasets to create a seamless transboundary database for landscape indicators
- Measure change across the CCE – Trend analysis
- Baseline year: 2000 - update every 5 yrs
The Partnership

- Crown Managers Partnership – Steering Committee
- NPS – Rocky Mountain Inventory and Monitoring Network
- University of Calgary, Foothills Facility for Remote Sensing and GIScience
- Great Northern Landscape Conservation Cooperative
- Roundtable for the Crown of the Continent – Adaptive Management Initiative
Jurisdictional Complexity in the Crown of the Continent

First Nations/Tribal land
National Parks
US Bureau of Land Management
US Fish & Wildlife
US Forest Service
Federal
Provincially Protected Areas
State Trusts
Montana Fish, Wildlife, & Parks
Provincial/State
Private Conservation Land
Plum Creek Timber
Private Land
Landscape Indicators & Datasets

Develop a suite of comprehensive transboundary geospatial datasets and maps representing various attributes of the landscape at the CCE scale and applicable to the assessment.

**Indicators**
- Roads
- Road use
- Human structures and human use
- Rivers/Riparian
- Species composition
- Vegetation structure
- Net primary productivity
- Forest/non-forest

**Datasets**
- Roads/Railroads/Trails
- Census statistics
- Streams/hydrology
- Land cover
- Crown closure
Landscape-scale Trend Analysis

- Data-base: Inventoried and synthesized all of the freely available geospatial data within the CCE for the land cover, phenology, disturbances, hydrology and roads

- First series of baseline data maps

- Two Reports:
  - CMP Landscapes Data Review Report – A Review of Baseline Geospatial Datasets for the Crown of the Continent Ecosystem Landscape Project
  - NPscapes Products: Presenting examples of maps and statistical tables derived through NPscape (2010)
Streams and riparian buffers
Natural disturbances

Insects

Fire history
Knowledge Formulation: The Transformation of Data to Wisdom

- **DATA**: Raw facts
- **INFORMATION**: Data selected, assembled, and prepared for a particular use
- **KNOWLEDGE**: Information understood, usually with context and evidence
- **WISDOM/MANAGEMENT**: Informed decisions made
The Role of Geospatial Information

- Geospatial information plays a central role in modern resource management
- Establishes the foundation for higher-level knowledge products
Where are Grizzly Bears on the Landscape?
RSF “Probability of Occurrence” Maps. An RSF is any function that is relative to the probability of use for resource units.

Statistical Modeling

- Dist. To Edge
- Ruggedness
- Phenology
- Species comp
- Crown closure
- Land cover
- bear use / avail.

G20 (Fall) RSF

- Low
- Mid
- High

- Testing pt (validation location)
Two-Dimensional Habitat Model

- Non-critical habitat
- Secondary sink
- Secondary habitat
- Primary sink
- Primary habitat
Creating a seamless transboundary database

- Goal: To acquire and synthesize existing datasets to create a seamless transboundary database across the entire CCE

- Baseline year: 2000
- Update every 5 years
Creating a roads layer

State and Provinces Roads

Statistics and Census Roads

Comparison Gaps
The Need for Accurate and Consistent Multi-Jurisdictional Information

- Issues surrounding geospatial data sets are significant, and often overlooked

- We require high-quality map products that are consistent, reliable, and up-to-date
Knowledge Formulation in Applied Science

Errors/uncertainty

The Scientific Community

Resource Managers and Regulators

Errors/uncertainty

Errors/uncertainty

DATA

INFORMATION

KNOWLEDGE

WISDOM/ MANAGEMENT
Grizzly Bears

- What are the local and regional factors controlling occupancy and abundance?
- What predictors should be monitored over time?
  - e.g. roads, oil/gas, mining, forestry
- What is the value of parks and protected areas?
- What is the difference between areas where we find and don’t find bears?
- What are potential habitat areas as grizzly bear populations expand?
Some of our objectives:

• What are the local and regional factors controlling occupancy and abundance?

• What predictors should be monitored over time?
  - e.g. roads, oil/gas, mining, forestry

• What is the value of parks and protected areas?

• What is the difference between areas where we find and don’t find bears

• What are potential habitat areas as grizzly bear populations expand?
Factors controlling local and regional abundance

- Vegetation (NDVI)
- Density of wells
- Density of secondary roads
- Density of riparian habitat
- Sedimentary rock
- Vegetation (NDVI)
- Density of wells
- Density of secondary roads
- Density of riparian habitat
- Mean temperature
- Mean precipitation
- Terrain roughness
- Net primary productivity
- Protected areas
- Human population density
- Distance to highway
- Density of riparian habitat
- Mean temperature
- Distance to pine beetle disturbance
Some of our objectives:

• What are the local and regional factors controlling occupancy and abundance?

• What predictors should be monitored over time?
  • e.g. roads, oil/gas, mining, forestry

• What is the value of parks and protected areas?

• What is the difference between areas where we find and don’t find bears

• What are potential habitat areas as grizzly bear populations expand?
Next steps…

- Moving through time: trend analysis
- Expanding our collaborations: terrestrial and aquatic invasives
- Other species
2005 Relative Probability of Grizzly Bear Mortality

Legend
Relative Mortality Value
High: 10
Low: 1

7.5 Kilometers
The End