

Northern Rocky Mountain Enduring Features GAP Analysis - World Wildlife Fund Conservation

Executive Summary

Ecosystem representation has long been recognized as a fundamental conservation goal of protected areas planning. Representation can be evaluated using a number of different techniques, which are popularly known as gap analyses. For approximately 7 years, WWF Canada has been engaged in a nationwide conservation gap analysis that has focused primarily on the physical variability within well-defined ecological units (e.g., natural regions or ecoregions). Physical variability has been mapped and protected status evaluated using what has been termed an "enduring features" approach. Enduring features are defined as combinations of surficial geology, topographic variation, and soil texture which are believed to be good predictors of the biological variability within ecosystems.

The primary objective of this study was to perform an enduring features conservation gap analysis for a pilot region within the U.S. (northern Rocky Mountains) that applied the same methodology as WWF Canada, resulting in a consistent crossboundary conservation assessment for the region for the first time. The Rocky Mountains were chosen over other crossboundary areas because this region is under increasing pressure from human enterprise on both sides of the border, yet it still maintains a full complement of species including large carnivores. The conservation actions taken over the next decade will largely determine whether this portion of the Rocky Mountains continues to function in a way that supports the many species and natural processes which have made it world famous: there is much at stake.

The greater study area as taken from the Carnivore Strategy included the Rocky Mountains in BC and Alberta and the U.S. northern Rocky Mountains (approximately 690,000 square kilometers). This GIS-based research project concentrated mostly on the U.S. side of the border, as we attempted to duplicate the Canadian methodology on similar, but different, electronic datasets. The region was first subdivided into 50 ecoregions (or natural regions), 32 of which were exclusively contained within the U.S. or straddled the Canada - U.S. border. Enduring features were then mapped and representation evaluated for each of the 32 ecoregions. Finally, these results were added to the Canadian work for regional summarization. In addition to the enduring features gap analysis, enhancements to the methodology were examined for the U.S. portion of the study area using larger scale datasets. A physical units mapping procedure was developed and examples compared to the coarser scale enduring features analysis. Finally, a number of separate analyses (e.g., road density analysis) were performed for the U.S. portion of the study area that can now be used to support continuing conservation research in the region.

Results showed that establishing a fully-representative system of protected areas in the overall study area will require contributions from all existing land ownership categories, not just federal or provincial government land holdings. Private and tribal lands made up a significant portion of the region and were found to be particularly important. Approximately 16% of the greater study area was found to be protected, primarily distributed among 5 distinct protection nodes. However, of the 115 protection polygons examined, over 60% were <10,000 hectares. Only a few large protected areas (>1,000,000 hectares) were found in the region.

Organized by ecosection, protection percentages ranged from 0% to 84%. Of the 739 enduring features described for the greater study area, 76% were found to be partially (93) or not captured (469). Only 4% (33) were found to be moderately captured and 19% (144) of enduring features were found to be adequately captured. The area covered by these 144 enduring features totaled 23% of the regional landscape. Only 7 of the 50 ecosections in the greater study area were classified as "adequately represented" followed by 10 ecosections classified as "moderately represented", 10 as "partially represented" and 23 as "little or not represented" - nearly half of all the ecosections mapped for the greater study area. Even though this region of North America is known for its spectacular National Parks (e.g., Yellowstone, Banff-Jasper, and Waterton Lakes-Glacier), the physical variability in the region as a whole was found to be poorly represented. High elevations were found to be strongly emphasized in the region with many low elevation landforms totally missing from the current system. In addition, landforms containing eolian, lacustrine, alluvium, sandstone, shale/mudstone, and volcanic ash were poorly represented. Road density results clearly demonstrated that it will be extremely difficult to connect the existing large protection nodes allowing for the movement of organisms such as large carnivores (e.g., wolf, *Canis lupus*).

The more-detailed physical units mapping was found to add a significant level of detail to the enduring features analysis capable of providing powerful ecological information to conservation planners in the region. The general technique could also be implemented in other parts of North America as a stand-alone study or in tandem with enduring features mapping or biologically-focused gap techniques. The physical features approach, when added to these other gap analyses, would strengthen our ability to plan for functional, representative nature reserves systems.

Numerous conservation challenges face this ecologically important region of North America. Based on our results, a number of general recommendations can be made that will significantly help conservationists establish a fully-representative network of protected areas that will provide high ecological integrity for both the individual parks and for the reserve system as a whole. These recommendations include:

- All ownership categories must be included in order to establish a fully-representative protected areas system.
- Lower elevation landforms should be aggressively evaluated in all ecosections and, where appropriate, substantial areas added to the existing reserve network in a complimentary way. Special emphasis should be paid to non-forested ecosystems and low elevation forest types. Current or historic wintering grounds of large mammals could provide an excellent starting point.
- Landforms with surficial geologies of eolian, lacustrine and alluvial deposits should receive special attention when considering additions to the existing protected areas network. Landforms composed of sandstone, shale/mudstone, and volcanic ash should also be emphasized.
- In many of the ecosections classified as adequately or moderately represented, there are still numerous enduring feature types that require additional protection.
- Parks comprised of the various landforms should be connected to provide not only horizontal movement across the regional landscape, but also vertical movement up and

down mountain slopes. Roads and other cultural elements are of particular concern when considering connectivity issues.

- Key linkage zones between the 5 major protection nodes require special attention in order to reconcile representation goals with the life history needs of target species such as many wide-ranging carnivores.
- The small size and isolation of most of the protected areas outside of the 5 primary nodes should be addressed and remediated wherever possible.
- Physical units mapping, if replicated over the entire study area, would dramatically improve our understanding of the physical variability within ecosections (or natural regions) and would be particularly useful in the actual site selection of future reserves.
- Watershed level planning should be employed when considering many of the ecosystem integrity concerns for the region. Protected areas planning should consider capturing as many intact subwatershed basins as possible when establishing a new protected areas or extending the boundaries of existing ones.
- Water resources themselves should become a focal point for future analyses. Water plays a significant role in the overall functionality of what is largely perceived to be a terrestrial environment.

The study area examined in this project is a very strong candidate for examining several fundamental conservation biology issues. The first deals with the differences between a physically-based gap analysis and a biologically-based one. Little empirical evidence exists showing the advantages or disadvantages of one over the other. Because of the work completed through this project and the increasing availability of region-wide biological data (e.g., state GAP programs and BC Ministry of Environment, Lands and Parks), the opportunity now exists to conduct a high-quality comparison between these two approaches. Also, numerous species (particularly large carnivores) continue to be heavily studied in the region making the northern Rocky Mountains a major focal point for reconciling species-focused conservation planning with ecosystem representation approaches. Lastly, a rigorous ecological monitoring program should be initiated throughout the region in an attempt to develop standards against which conservation progress can be measured. Until we have the proper ecological indices being routinely examined, we will never have the empirical evidence we need to evaluate conservation action adequately.