

Protected Areas in Boreal Alberta: Considerations for Design and Implementation

Key roles of protected areas:

- **Maintenance of biodiversity.** A system of protected areas designed and managed to maintain ecological integrity can provide a refuge for species that are adversely affected by industrial activities and a source for repopulation of the industrial land base once deleterious activities are rectified.
- **Conservation of wilderness.** Polls have demonstrated strong public support for the preservation of wilderness (which implies the prohibition of industrial activities and associated road-building). Given that virtually the entire province of Alberta is of interest to the resource industry, protected areas are required to ensure that some regions of wilderness remain intact.
- **Ecological benchmarks.** Protected areas, acting as ecological benchmarks in which natural processes are maintained, can serve as experimental controls to help monitor the impacts of industrial activities on the industrial land base.
- **Research.** As the natural landscape becomes fragmented and modified by road building and resource extraction, it will become progressively more difficult to find study areas in which to investigate natural processes. Consequently, protected areas will take on an increasingly important role as study areas for future research.

Design considerations:

- **Representation.** To meet the habitat requirements of all species, protected areas must provide representation of the full spectrum of ecosystem types. At a coarse scale, this can be accomplished by establishing protected areas within each of the province's Natural Subregions. At a finer scale, specific landscape features, such as river valleys and sand dune complexes, must also be sufficiently represented.
Ecological integrity. The survival of species is dependent not only on the availability of habitat, but also on the maintenance of ecological integrity (which incorporates the maintenance of natural ecological processes such as disturbance and renewal). Large size is the key requirement, as simulation studies have shown that in Alberta areas of several thousand square kilometers are required to maintain natural fire regimes. Other approaches for maintaining ecological integrity include: (1) prohibiting industrial activities, (2) limiting motorized activities and the development of new access routes, and (3) design that incorporates a buffer zone. To ensure that natural processes are maintained indefinitely, boundaries must be permanent (i.e., legislated).
- **Connectivity.** Some species have such large area requirements that viable populations cannot be achieved in individual protected areas, even if they are several thousand square kilometers in size. Consequently, a system of protected areas must be designed to facilitate the movement of individuals among sites so that viable populations of all species can be achieved in the system as a whole. Connectivity among protected areas is also required to facilitate the movement of species in response to climate change. To facilitate movement between sites,

special management of the intervening landscape will be required such that high-quality habitat is maintained and barriers to movement are minimized.

Implementation:

- As of 1999, 10.4% of northern Alberta was under some form of protection. However, because Wood Buffalo National Park (WBNP) accounts for 97.1% of this area, several Natural Subregions are not adequately represented in the system. Furthermore, with the exception of WBNP, none of the protected areas are large enough to adequately maintain ecological integrity.
- Based on the design considerations described above, the system of protected areas in northern Alberta should include a set of large core reserves (i.e., in the range of 5,000 km²) distributed among all Natural Subregions. The requirement for multiple core reserves reflects the need to (1) represent all ecosystem types, (2) ensure wide geographic distribution to facilitate recolonization of the industrial land base, if required, (3) locate ecological benchmark areas as close as possible to regions of high industrial use, and (4) incorporate redundancy into the system to accommodate climate change and unforeseen changes.
- Although the Central Mixedwood Subregion is represented in WBNP, at least one other large core area is warranted in this Subregion given that it constitutes almost one quarter of Alberta. Furthermore, all of Alberta's oil sands development, along with considerable conventional oil and gas activity and several forestry operations, are located in the southern half of the Central Mixedwood.
- For representation of all major Natural Subregions, and additional representation of the southern Central Mixedwood, five new large core areas are required in northern Alberta. The optimal placement of these core areas, based on representation of Natural Subregions, areas of high ecological significance, amount of intact wilderness, and requirements for maintaining ecological integrity, is readily apparent (Fig. 1).
- Even if the large core areas are several thousand square kilometers in size they will not be able to capture all of the ecological diversity of northern Alberta. Additional protected areas of smaller size (100-1,000 km²) will be needed to represent unique localized landscape features (e.g., sand dune complexes), areas of particularly high diversity (e.g., major river corridors), and the specialized habitat needs of rare or endangered species (e.g., peatlands for caribou). The protected area system in northern Alberta must also incorporate corridors and buffers.
- The protected area framework presented here is based on minimum requirements for representation and integrity necessary for the maintenance of biodiversity. The 5 proposed core areas, at 5,000 km² each, add 6.9% to the 10.4% of northern Alberta that is currently protected (as of 1999). With the addition of supplemental sites required for the protection of unique landscape features and habitat types, the total area of protection is in accordance with the 20% target that the Senate Sub-Committee on the Boreal Forest (1999) has suggested is appropriate for the boreal forest based on biodiversity concerns. Additional area may be required to meet public demand for wilderness preservation.

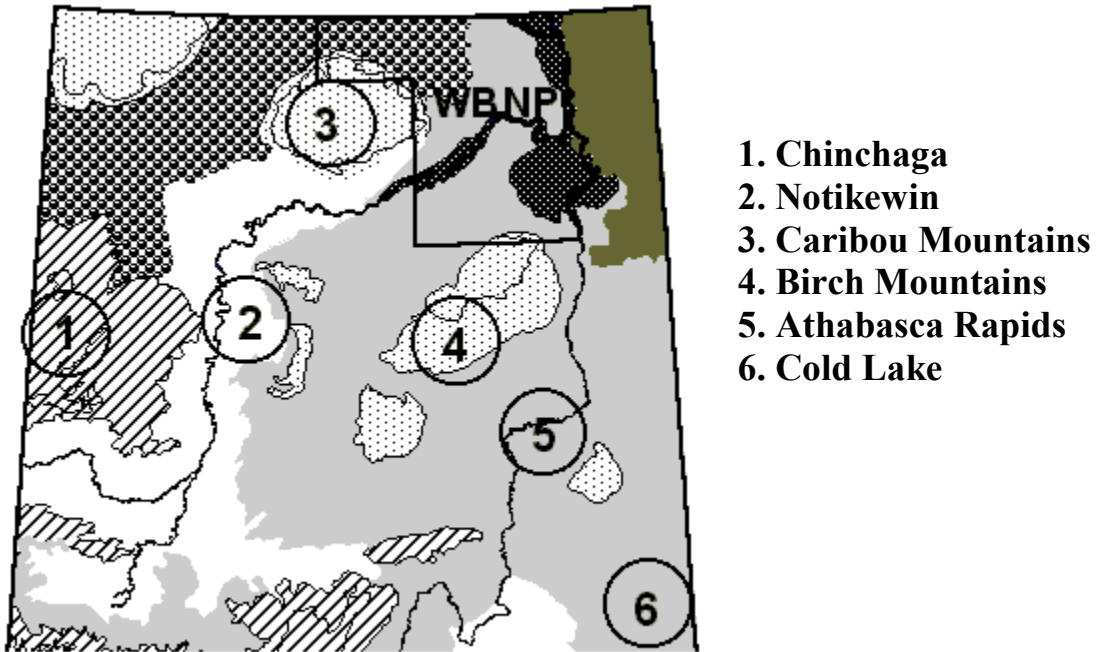


Fig. 1. Candidate locations for large core protected areas. Each area is 5,000 km², drawn to scale. Two options for the Central Mixedwood are shown (5 & 6). Shaded backgrounds represent the Natural Subregions of northern Alberta.