

BIG ANIMALS and SMALL PARKS: Implications of Wildlife Distribution and Movements for Expansion of Nahanni National Park Reserve



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SUMMARY

The boundaries of Nahanni National Park Reserve, in the Northwest Territories of Canada, were established quickly in 1972 to protect the spectacular waterfalls and canyons of the famed South Nahanni River. The focus at the time was to protect the river corridor from destruction by a proposed dam and reservoir. Consequently, the Park Reserve was <8 km wide in some sections while encompassing only 4765 km² (about 14%) of the South Nahanni River watershed. In 1978, the United Nations (UNESCO) recognized Nahanni National Park Reserve as a World Heritage Site. Parks Canada has mandated responsibility for ensuring the ecological integrity of national parks, and the native people of the Dehcho First Nations and Sahtu communities have expressed a strong interest in conserving the integrity of Nahzã Dehé (Slavey name for the South Nahanni River area) in their traditional territories.

Nahanni National Park Reserve itself, however, represents a classic example of the ‘boundary problem’ that confronts many national parks and other protected areas across the world: it is too small and too narrow. The problem is particularly acute for large carnivores and northern ungulates that typically range widely, occur at low population densities, and possess little resiliency to human impacts. Consequently, they require large, secure areas to sustain populations. With major industrial developments across the Mackenzie River basin imminent, there is a time-limited opportunity to address the problem of the Park’s inadequate boundary by designing a better blueprint for conservation of wildlife and

ecological integrity.

I conducted field studies during 2002-2005 on grizzly bears, Dall’s sheep, and woodland caribou. The research goal was to develop spatially-explicit, scientific data about the distribution and seasonal movements of these landscape species that could inform decisions regarding Park expansion and land use plans of the Dehcho and Sahtu. For planning purposes, Parks Canada and the Dehcho delineated an area (40,000 km²) called the ‘Greater Nahanni Ecosystem’ (GNE), which included all of the South Nahanni River watershed plus an area north of the lower canyons known as the Nahanni Karstlands.

Grizzly bears range across a wide variety of habitats, but they have a very low reproductive rate – especially in the north – and cannot readily compensate for increased mortality. Consequently, grizzlies have low resiliency in the wake of human developments, and areas of high security have emerged as a key conservation strategy for this species. Our research team surveyed grizzly bears across the entire watershed using non-invasive hair snaring methods and DNA analysis to identify individual bears and modeled the distribution of the grizzly population using terrain and land cover variables.

We detected grizzly bears at 49% of 225 stations and estimated the overall density at 17.3 bears per 1000 km². Diverse mountain landscapes in the north-central and northwest sectors of the Greater Nahanni Ecosystem (mostly outside the present Park) had the

highest occurrence and density of grizzly bears, whereas boreal forests in the southern sector had the lowest occurrence and density. Through supplemental collection of bear hair on natural rub trees, we documented that many grizzly bears also used the main valleys along the South Nahanni and Flat River valleys and the Rabbitkettle Lake area. Multiple detections of individual bears suggested that male grizzly bears may range over 2000 km². A combination of ‘moderate → very high’ density classes yielded 75% of the estimated population by covering 59% of the Greater Nahanni Ecosystem.

Dall’s sheep are habitat specialists that use alpine tundra habitat near cliffs which provide adequate escape from predators. They possess moderate resistance to human impacts but low resiliency if a local population is reduced or extirpated. During the last ice age, the Mackenzie Mountains served as a key refugium for Dall’s sheep, which resulted in a diverse and distinctive genetic structure. I compiled data from various sheep surveys and delineated 27 sheep ranges that covered 3159 km² (7.9%) of the Greater Nahanni Ecosystem. Key ranges harboring some of the larger populations (Liard Range, Tlogotsho Plateau, Headless and Funeral Ranges, and Nahanni Plateau) were located primarily in the northern and eastern sectors of the ecosystem where winter snow pack is shallow and/or windblown. Average density of Dall’s sheep was low but representative of sheep densities throughout the Mackenzie Mountains; the total population in the Greater Nahanni Ecosystem may be 800-1200 animals. Importantly, only a small portion of the primary sheep ranges lie within the present boundaries of Nahanni National Park Reserve (<10%), and several extensive ranges lie entirely outside the boundary.

Extending northward from First Canyon along the lower South Nahanni River is a limestone landscape that exhibits the most diverse and striking karst features anywhere in the arctic or sub-arctic regions of the world. During our sheep surveys in 2005, we discovered a new area with a high concentration of karst caves that were used by Dall’s sheep. One of the most noticeable features was the lush carpet of grasses and forbs at the entrance of most caves, which appeared as oases in a desert of stone. These karst caves on the Nahanni and Ram Plateaus provided both security and food for ewe-lamb pairs, which may enhance survivorship of lambs. Based upon conversations with leading sheep biologists across North America, I concluded that this concentration of karst caves used by Dall’s sheep is unique on the continent.

Woodland caribou rely heavily upon terrestrial or arboreal lichens, especially in winter when they seek out windblown alpine sites or mature conifer forests at lower elevations where snow pack is shallow. They possess comparatively low potential for population growth, which limits their capacity to rebound from impacts. Woodland caribou populations are especially vulnerable to loss and fragmentation of key habitats and high mortality from predation, hunting, and poaching. Woodland caribou have low resiliency and their range in some parts of Canada has receded over the past 100 years coincident with the expanding footprint of industrial logging and other human activities. The Northern Mountain population of woodland caribou is listed as one of ‘special concern’. Three different herds of woodland caribou use the Greater Nahanni Ecosystem: (1) Redstone herd, (2) Upper Nahanni herd, and (3) Lower Nahanni herd which consists of the Coal and LaBiche groups.

The Redstone caribou herd is one of the largest herds of the mountain type of woodland caribou in the Northwest Territories and may number 5,000-10,000 animals. Satellite tracking of collared

animals during 2002-2005 revealed that they used the headwaters region of the South Nahanni River as a traditional calving area in late May and early June, and the upper reaches of Clearwater/ Cathedral/ Wrigley Creeks as a traditional area during the fall rut and winter. Both of these areas are outside the present park boundary.

The Upper Nahanni caribou herd occupied a range of 17,500 km² across the northern and center sections of the South Nahanni River watershed. Based on aerial surveys in 2001, biologists estimated 940-1140 animals in this herd. Aerial and satellite tracking of collared caribou 1995-2001 showed that during the calving period, most animals moved into the upper part of the South Nahanni River watershed (Little Nahanni River basin), where they used a diverse landscape of subalpine open woodland, spruce-lichen woodland, subalpine shrubland, and tundra types. During summer and the fall rut, caribou remained in this same area which is outside the park boundary. Between mid-October and mid-November, they migrated approximately 160-170 km down the main South Nahanni River valley into Nahanni National Park Reserve. In most years, this caribou herd wintered in the montane spruce-lichen woodlands along the South Nahanni River valley above Virginia Falls and lower reaches of the adjacent Clearwater-Cathedral Creek basin. During spring migration, they essentially re-traced their fall migration routes. Members of the Upper Nahanni caribou herd showed strong fidelity over time to these seasonal ranges and migration routes.

The Lower Nahanni herd (comprised of the Coal River and LaBiche groups) occupied a range of nearly 32,000 km² that straddled the Yukon-Northwest Territories border (about 45% on the NT side). Based on aerial surveys carried out by Yukon biologists in 1993 and 1997 over part of the area, it's likely that this herd numbered at least 731-878 caribou at that time. Satellite tracking of collared caribou 2000-2005 revealed that during summer and

the fall rut, most of the caribou resided on alpine plateaus and subalpine basins scattered across a 240-km arc in southeast Yukon. Some animals, however, did spend the summer along the Territorial divide. After the rut, caribou migrated as far as 240 km eastward from southeast Yukon over the divide and into the Greater Nahanni Ecosystem. In harsher winters, animals moved earlier and further east to a core winter range centered on the confluence of the Flat River and the South Nahanni River in Nahanni National Park Reserve. Most caribou locations at this season were in the montane spruce – lichen woodlands at 400-900 m elevation. During spring migration, collared members of the Lower Nahanni caribou re-traced their fall migration routes. The expansive boreal forest in the southwest sector of the Greater Nahanni Ecosystem, located in a 'snow shadow' in the lee of prevailing winter storms from the southwest, provided crucial habitat for this trans-border herd from November to May.

One of the most robust messages emerging from conservation science in recent years is that populations of large animals need large spaces. Most national parks around the world are simply too small to protect the values therein. Indeed, one of the leading causes of contemporary declines in wildlife populations has been fragmentation of habitat and diminished security for vulnerable populations. Clearly, our research findings reveal that Nahanni National Park Reserve is too narrow and too small to protect these wide-ranging, vulnerable wildlife. Hence, to secure ecological integrity of Nahanni National Park Reserve, it is necessary to expand the park to protect critical seasonal ranges of these wildlife species from loss and fragmentation of habitat, contribute substantially to sustaining viable populations, and safeguard unique phenomena.

Based upon the empirical data, sound principles of conservation science, and my own extensive field experience across the Greater Nahanni Ecosystem and other national parks in the Rocky Mountains, I recommend that Nahanni National Park Reserve be expanded to include the entire South Nahanni River watershed and the adjacent Nahanni Karstlands. This recommendation does not include some areas along the eastern side of the GNE which do not appear to be important for the conservation of these particular wildlife species. The recommended area comprises about 38,000 km², or approximately 95% of the Greater Nahanni Ecosystem. Such an expansion would:

- ✓ Protect important ranges and habitat for several wide-ranging wildlife species that are vulnerable to human impacts due to their low resiliency (grizzly bears and woodland caribou) and/or their reliance on special landscapes (Dall's sheep).
- ✓ Safeguard the high level of genetic diversity present in these wildlife populations.
- ✓ Encompass the variety of land cover types and landscape features that are representative of the Mackenzie Mountains.
- ✓ Protect the unique assemblage of caves used by Dall's sheep as well as other world-class karst features.
- ✓ Safeguard the natural integrity of the entire South Nahanni River watershed which is one of the most spectacular and intact wild landscapes in North America, a place where natural processes continue to mold the land and the life therein.
- ✓ Provide room for plants and animals to move and shift northward and higher in elevation in response to climate change.