

Extent of the Global Network of Terrestrial Protected Areas

For metrics, such as extent of protected areas, to inform global conservation efforts, the data sets on which the metrics are based must be comparable. The World Database on Protected Areas (WDPA) is the most comprehensive set of spatial data available on marine and terrestrial protected areas worldwide. The United Nations Environment Programme's World Conservation Monitoring Centre (UNEP-WCMC) has compiled and updated these data yearly since 1981. These annual releases serve the global conservation community by providing updated, standardized data on protected areas.

Information provided in the WDPA includes the size, location, and the International Union for Conservation of Nature (IUCN) category (if one has been assigned) of all sites listed in the WDPA. When available, information on boundaries of these areas is provided as polygon geographic information system (GIS) shapefiles. Otherwise, sites locations are provided as point shapefiles. For sites that have both marine and terrestrial cover, information on the area of the two cover types is also provided. Yet, the WDPA is a work in progress. Not all sites in the database have biodiversity conservation as their primary management objective, and not all extant protected areas are included in the data set, which reflects global disparities in the availability of information. Current estimates of the coverage of the global network of protected areas are based on the data provided by the WDPA and suggest that between 11% and 12.9% of the world's land surface is protected within reserves (e.g., Chape et al. 2005; Soutullo et al. 2008; Jenkins & Joppa 2009).

The IUCN's recent revision of the protected-area concept (Dudley 2008) challenges these figures. One of the advantages of the IUCN system of protected-areas classification is that it provides international standards for global and regional accounting and comparisons among countries, and a common framework for the collection, analysis, and dissemination of data on protected areas (Dudley 2008). Over the last 5 years, the IUCN revised its definition of *protected area* substantially. A fundamental question in the revision process was whether *protected area* should be treated as a general term that embraces a wide range of land and water management types that are of value for species and landscape conservation, or as a more precise term that describes a particular form

of management aimed specifically at conservation. The conclusion was that only areas designated for the primary purpose of conserving nature should be considered protected areas. One implication of this new definition is that not all areas that are valuable to conservation (including some managed forests and military training areas) are currently considered protected areas by IUCN standards (Dudley 2008).

This applies to some of the sites in the WDPA. Thus, given this change in definition, it is unclear how to handle information on sites in the database, which have not been assigned an IUCN category. These sites may be protected areas by IUCN standards, or sites that contribute to conservation, but were not established for conservation purposes primarily. Hence, the contribution of these sites to conservation may change as actions are taken to meet the primary goals of these areas.

Partially to account for changes in the definition of *protected areas*, the WDPA has been revised. The 2009 release of the WDPA incorporates the results of this review, including additions and deletions to the list of protected areas, and a substantial increase in the number of protected areas for which there is information on shape, size, and location. Nevertheless, the WDPA cannot yet provide accurate information for all the sites in the database. For more than 37,000 of those sites, no IUCN category is available, and for almost 40,000 no boundary information is provided. How then should one use the WDPA to assess the coverage of the global network of protected areas? More specifically, how should one use the information on sites that we do not know whether they meet the IUCN criteria for listing as a protected area? I suggest that only sites for which information on IUCN category is provided by the WDPA be treated confidently as protect areas.

As long as limitations on the information available for the sites in the WDPA database remain, we should not pretend to have an accurate accounting of the coverage of the global network of terrestrial protected areas. I suggest a more cautious approach that is based on calculating conservative estimates of coverage and an upper limit. An upper limit of coverage can be calculated from the WDPA database (and updated with every new release) by subtracting the sum of the marine area of all sites in the WDPA from the total area of the sites. Similarly, a conservative estimate can be calculated by subtracting the sum of the marine area of all sites categorized as protected by IUCN from the total area of these sites.

On the basis of the information provided in the 2009 WDPA, I calculated that between 10.1% and 15.5% of the world's land surface is protected within protected areas. This estimate does not take into account the overlap among protected areas or the area of the 5698 sites for which no information on size is available. As long as new sites are added to the data set (either because new protected areas are designated or because new information on extant protected areas is collected), the status of currently uncategorized sites is clarified, and information on boundaries is improved, these estimates will change. As long as the WDPA is incomplete, I suggest being cautious when communicating to the global community the extent of the global network of terrestrial protected areas. As pressure on the last wild lands increases, overestimating the extent of Earth's protected land surface by even 1% is simply unacceptable.

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Literature Cited

- Chape, S., J. Harrison, M. Spalding, and I. Lysenko. 2005. Measuring the extent and effectiveness of protected areas as an indicator for meeting global biodiversity targets. *Philosophical Transactions of the Royal Society B, Biological Sciences* 360:443–455.
- Dudley, N. 2008. Guidelines for applying protected area management categories. International Union for Conservation of Nature, Gland, Switzerland.
- Jenkins, C. N., and N. Joppa. 2009. Expansion of the global terrestrial protected area system. *Biological Conservation* 142:2166–2174.
- Soutullo, A., M. De Castro, and V. Urios. 2008. Linking political and scientifically derived targets for global biodiversity conservation: implications for the expansion of the global network of protected areas. *Diversity and Distributions* 14:604–613.

Imminent Extinctions of Woodland Caribou from National Parks

Mountain caribou (*Rangifer tarandus caribou*) have been critically endangered in Banff National Park (BNP) for at least 15 years, and their extinction from the area is not surprising (Hebblewhite et al. 2010). This situation is disheartening because national parks are supposed to provide refugia for threatened species and to safeguard them for future generations. Inaction has failed both caribou and concerned citizens. It is critical, therefore, to understand why the system failed because no amount of hard work researching the ecosystem will save species if suggested recovery strategies are not implemented.

Hebblewhite et al. (2010) provide three hypotheses as to why mandated actions under Canada's Species at

Risk Act (SARA) proceeded more slowly on national park lands than the provincial land in British Columbia and Alberta, which also support mountain caribou: (1) recent consensus among scientists of the pervasiveness of top-down predator-prey interactions and the large areas over which they may occur, (2) stakeholders and managers were unaware or did not accept these findings as reliable scientific knowledge, and (3) senior wildlife managers perceived no political consensus for caribou conservation within national parks.

We tested the universal nature of these hypotheses in Mount Revelstoke and Glacier National Parks (MRGNP), located 90 km west of BNP. Unlike BNP, which is part of a 29,232-km² block of protected areas but is still too small to contain an intact predator-prey system of large mammals (Hebblewhite et al. 2010), MRGNP covers only 1609 km². Also unlike BNP, a coordinated Parks Canada and Province of British Columbia telemetry-based research project on caribou was initiated in the MRGNP area in 1992 (in BNP there was little effort to learn about caribou until there were only five animals left in 2002; Hebblewhite et al. 2010). The population that includes MRGNP was estimated to have 121 (90% CL 106–161) caribou in 1994, of which 71 were observed within MRGNP. Over the course of nine censuses, the number of animals steadily declined to 13 by 2009, eight of which were seen inside MRGNP (Furk & Flaa 2009). Parks Canada is well aware of the rate of decline and knows that unless management actions are applied the extinction of these animals is imminent.

We reject Hebblewhite et al.'s (2010) first hypothesis because the implications of apparent competition on woodland caribou have been documented for decades (e.g., Bergerud 1974; Seip 1992; Wittmer et al. 2005). On the basis of available evidence, conservation actions have been implemented on public land in British Columbia and Alberta (B.C. Ministry of Environment 2009). Hypothesis 2 can, for the most part, be rejected. Parks Canada managers, like their provincial counterparts, were aware of apparent competition and the impact it was having on caribou. For example, Parks Canada managers were involved in developing the initial recovery plan for mountain caribou in British Columbia (Hatter et al. 2002), and this plan recognized apparent competition as a proximate factor in their decline. We agree with hypothesis 3. Senior park managers perceived no political consensus for caribou conservation within national parks because of the difficulty of integrating caribou conservation, which requires active population management, with the less interventionist approach often used within protected areas.

Mountain caribou recovery will involve actions that will be highly unpopular with some people. Actions to conserve caribou will include reducing forest harvesting, mechanized recreation, and the numbers of alternative prey and predators until after the early-seral stage of succession. Currently early-seral conditions are abundant

and favor high numbers of alternative prey and predators. Once the proximate cause of caribou decline (too many alternative prey and predators) is corrected, population augmentation will likely be required. Provincial governments are mandated to actively manage all these factors in a culture of active management. In comparison, it is mandated that the forests, prey, and predators in protected areas not be managed (notable exceptions include prescribed burning in dry ecosystems). The MRGNP's stated opinion, even in small parks, is that "predation is considered to be a natural and important process, necessary to retaining ecological integrity within an ecosystem" (MRGNP 2008). Similarly, MRGNP does not support the use of maternity penning in the park (MRGNP 2008), a method that protects mothers and their calves for one month, after which the risk of predation on calves decreases substantially.

To permit extinction in an ecosystem that has been changed drastically because of preserved natural processes at small scales may not be acceptable to citizens who entrust species survival to managers of protected areas. Once the caribou are gone (and they will be in MRGNP without active management [Wittmer et al. 2009]), then the immediate impetus for not harvesting large areas of primary forests outside the park is gone. The ramification of "preserving natural processes" on a small scale and letting extinction happen in protected areas may result in large-scale ecological changes associated with the likelihood of increased forest harvesting outside national parks.

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Literature cited

- B.C. (British Columbia) Ministry of Environment. 2009. Mountain caribou recovery implementation plan. Update to the mountain caribou progress board. B.C. Ministry of Environment, Victoria. Available from http://www.env.gov.bc.ca/sarco/mc/files/progress_board_update20090213.pdf (accessed November 2009).
- Bergerud, A. T. 1974. Decline of caribou in North America following settlement. *Journal of Wildlife Management* **38**:757-770.
- Furk, K. and J. P. Flaa. 2009. Population censuses of caribou in the north Columbia Mountains, Columbia South subpopulation. Report. Mount Revelstoke and Glacier National Parks, Revelstoke, British Columbia, Canada.
- Hatter et al. 2002. A strategy for the recovery of mountain caribou in British Columbia. British Columbia Ministry of Water, Land, and Air Protection, Victoria.
- Hebblewhite, M., C. White, and M. Musiani. 2010. Revisiting extinction in national parks: mountain caribou in Banff. *Conservation Biology* **21**:341-344.
- MRGNP (Mount Revelstoke and Glacier National Parks). 2008. Letter to British Columbia Ministry of Environment. 11 June 2008. MRGNP, Revelstoke, British Columbia, Canada.

- Seip, D.R. 1992. Factors limiting woodland caribou populations and their interrelationships with wolves and moose in southeastern British Columbia. *Canadian Journal of Zoology* **70**:1494-1503.
- Wittmer, H.U., R.N.M. Ahrens, and B.N. McLellan. 2010. Viability of mountain caribou in British Columbia, Canada: effects of habitat change and population density. *Biological Conservation* **143**:86-93.
- Wittmer, H. U., A. R. E. Sinclair, and B.N. McLellan. 2005. The role of predation in the decline and extirpation of woodland caribou. *Oecologia* **144**:257-267.

Banff's Mountain Caribou versus Spring Snails

Hebblewhite et al. (2010) recently revisited Berger's (2003) question of whether it is acceptable for a species in a national park to be allowed to go extinct. On the same day the Banff National Park (BNP), Alberta, Canada, population of threatened mountain caribou (*Rangifer tarandus caribou*) was extirpated in an avalanche in April 2009, they state that environmental groups (Ecojustice 2009) touted the Banff Springs snail (*Physella johnsoni*) as the only Canadian species to have full protection under the Species at Risk Act (SARA; Government of Canada 2002). Hebblewhite et al. suggest inertia was a major factor in the jurisdictional authority (Environment Canada) not following the provisions of SARA. They also present ideas on how to prevent other species from following the same road to oblivion. Finally, they ask, "... why the Banff Springs snail (for which Parks Canada was the designated federal agency under SARA), and not caribou, received sufficient recovery dollars." Although it could be argued strenuously that "sufficient recovery dollars" have never been available for the snail, other factors contributed to the contrast between the two species' roads to recovery.

First, the Banff Springs snail is an endangered, endemic species confined to a handful of thermal springs within BNP (COSEWIC 2008). The total habitat occupied by the species is only 595.4 m² (COSEWIC 2008). This small area has been designated critical habitat by Parks Canada Agency (2008) under SARA. Although we do not believe the area of occupancy was calculated for the wide-ranging mountain caribou population of Banff, it probably was a few orders of magnitude larger.

Second, as Hebblewhite et al. noted, the Parks Canada Agency was the sole jurisdictional authority to ensure the continued existence of the snail. In anticipation of the passage of SARA in 2002, a resource management plan for recovery of the species (Lepitzki et al. 2002) was approved by Parks Canada. Once SARA passed, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed endangered snail was listed automatically under SARA, as were other species on the COSEWIC list at that time. Finalization of the recovery strategy and action plan (Lepitzki & Pacas 2007) continued under the direction of a recovery team. This team was

and is composed of fewer than a dozen people. From the very beginning, we have been instrumental in ensuring the snail continues to survive in the face of continuing and increasing threats to it and its habitat (Lepitzki & Pacas 2007), including the cutting of research budgets, which currently permit not much beyond monitoring. Even this miserly budget (about the value of a few GPS collars) is in danger of being cut.

In contrast, Parks Canada Agency, under the direction of the Minister of the Environment, is but a single member of the group that has jurisdiction over the caribou. Inertia and too many cooks could definitely be a reason why the road to recovery of Banff's caribou was different from the road for the snail.

Third, the snail became known locally, nationally, and internationally because of actions of the recovery team. A search on the internet yielded over 47,700 hits for "Banff Springs snail" but only one hit for "Banff mountain caribou"; however, without quotes *Banff mountain caribou* results in over 135,000 hits, mostly tourism sites. Having four of the seven subpopulations (COSEWIC 2008) of the snail (seven includes the two reestablished populations) in an area of high visitor use that is the birthplace of Canada's national park system (Cave and Basin National Historic Site) increases the public profile of the diminutive snail. Concurrently, the over 100,000 visitors a year to the Cave and Basin also increases the snail's exposure to inadvertent or advertent disturbance of critical habitat. Where else can one get within centimeters of an endangered species?

We propose the following answer to Berger's (2003) question: Whether a species should be allowed to become extinct in a national park also depends on societal values, the characteristics of the species, and whether someone or a few are willing to advocate for it. If the species is small and occupies an extremely small area, it may be a lot easier to prevent its extinction. The Banff caribou-snail situation also begs another question: If humans cannot find the resources, both financial and personnel, to prevent the extinction of a species confined to

a national park and living in an area just under the size of the penalty box of a soccer pitch, what chance is there of saving other, wider-ranging species, such as grizzly bears (*Ursus arctos*), mountain caribou, and wolverines (*Gulo gulo*) (all assessed as at risk by COSEWIC), living in Canadian national parks?

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Literature Cited

- Berger, J. 2003. Is it acceptable to let a species go extinct in a national park? *Conservation Biology* **17**: 1451-1454.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2008. COSEWIC assessment and update status report on Banff Springs snail *Physella johnsoni* in Canada. COSEWIC, Ottawa. Available from http://www.sararegistry.gc.ca/status_e.cfm (accessed December 2009).
- Ecojustice. 2009. Canada's Species at Risk Act: implementation at a snail's pace. Ecojustice, Vancouver. Available from <http://www.ecojustice.ca/publications/reports/canadas-species-at-risk-act-implementation-at-a-snails-pace> (accessed December 2009).
- Government of Canada. 2002. Chapter 29, Bill C-5, an Act respecting the protection of wildlife species at risk in Canada. Bill C-5 assented to 12 December 2002. Public Works and Government Services Canada - Publishing, Ottawa.
- Hebblewhite, M., C. White, and M. Musiani. 2010. Revisiting extinction in national parks: mountain caribou in Banff. *Conservation Biology* **24**: 341-344.
- Lepitzki, D. A. W., and C. Pacas. 2007. Recovery strategy and action plan for the Banff Springs snail (*Physella johnsoni*) in Canada. Species at risk recovery strategy series. Parks Canada Agency, Ottawa. Available from <http://www.sararegistry.gc.ca/> (accessed December 2009).
- Lepitzki, D. A. W., C. Pacas, and M. Dalman. 2002. Resource management plan for the recovery of the Banff Springs snail (*Physella johnsoni*) in Banff National Park, Alberta. Parks Canada, Banff National Park, Banff.
- Parks Canada Agency. 2008. Description of critical habitat of the Banff Springs snail in Banff National Park. Available from http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=1584 (accessed December 2009).

