



Weighing the alternatives

The “rewilding” agenda

Conservation biology is not what its name implies—the study of life forms with an eye to their conservation. It is, rather, one aspect of a complex strategy of political, economic, and moral activity, the purpose of which is to restore and maintain a “pristine” or “wild” landscape untouched by human presence (LeRoy and Cooper 2000). In the words of ESGBP researcher, Mike Gibeau, “the focus on grizzly bears is viewed as one component nested within a much larger research agenda. That agenda seeks to apply a large carnivore conservation strategy to the Rocky Mountain Park complex as outlined by World Wildlife Fund (WWF)” (Gibeau 2000: 1). The WWF strategy is part of an even more ambitious political, economic, and biological program conventionally referred to as “rewilding.”

Although it is comparatively unknown to the general public, the concept of “rewilding” is widely supported among environmentalists, their associated interest groups, and sympathetic bureaucrats and politicians. The Wildlands Project, the Yellowstone to Yukon Conservation Initiative (Y2Y), the Baja to Bering Marine Conservation Initiative (B2B), and the Adirondacks to Algonquin Initiative (A2A) are all closely linked and agree upon the desirability of “rewilding,” which, according to the Wildlands Project means: “to restore diversity, and help wounded lands become self-willed again” (2000: 84). Rewilding is to be practically achieved by creating a vast network of “core” wilderness areas, surrounded by protected “buffer zones” and connected by wildlife “corridors” stretching across the continent. Proponents of these projects consider them to be the means to implement a “new paradigm” in protected areas management. A significant implication of the new paradigm is that, where existing property rights, traditional multiple use, and human enjoyment conflict with this aim, they will be subordinated to the overriding ecological purpose of allowing a wounded land to reassert its will. Even if habitat fragmentation was causing serious inbreeding depression in grizzly bears in the central Rockies (and it is not), the notion that traditional property and individual rights

must be sacrificed in order to “heal a wounded landscape,” and to maintain or restore habitat connectivity from Yellowstone to Yukon is worth serious scrutiny. Indeed, the anthropomorphic and, indeed, neo-pagan language that suggests a land can be wounded and possesses a will indicates that an additional agenda or purpose is being served by such a project.

On a more modest scale, but also of immediate concern, one result of employing this “new paradigm” is to expand government regulatory authority over private and leased land well beyond the specially zoned areas of Canada’s national parks. In 1970, for example, Stephen Herrero argued that “it may be necessary to regulate human population density and distribution in the back country” of North American parks (Herrero, 1970: 1152). By 2000, however, Herrero’s concerns were not limited to the back country of parks; he then advocated the legislative creation of “administrative flexibility” to meet habitat goals by renegotiating existing leases and tenures (Herrero *et al.* 2000: 9). Another recent paper, co-authored by a member of the federal government’s Panel on Ecological Integrity, argued that “reducing the losses of large mammals in the future will require that the total area of species habitats in parks will be augmented either through the acquisition or the cooperative management of non-federal lands adjacent to parks (Landry *et al.* 2001: 20).

The campaign to have both the Cheviot mine outside Jasper and the Three Sisters Mountain Village development outside Banff stopped are excellent examples of this new approach in action. In the case of the Cheviot mine, the province established Whitehorse Wildland Park, a buffer area of 17,500 hectares (43,000 acres) between Jasper and the Cheviot mine, to mitigate the environmental impact of the mine. Although the creation of this new protected area exceeded the recommendations of the 1997 environmental impact report of the Canadian Environmental Assessment Agency and the Alberta Energy and Utilities Board, which approved construction of the mine, environmentalists still objected.⁷ While initially approved in 1992, the prolonged environmental approval process for the Three Sisters Mountain Village prompted the project’s

initial owner to back out. Ten years later, Three Sisters has spent millions of dollars on environmental and wildlife science and design to study and mitigate the effect of their development on local and regional wildlife populations. Nonetheless, continuing pressure from environmental groups has been directed at forcing the government to withdraw its approval for the development project (Robinson 2001; Herrero and Jevons 2000). Despite the fact that these areas were already approved or were located on private land, environmental activists expected the same level of success in stopping the Cheviot mine and the Three Sisters development as they enjoyed in stopping or influencing development decisions inside the parks.

Perhaps a more significant example of the influence of those who advocate rewilding occurred in Radium, British Columbia, where, despite a serious agency-wide funding shortage, Parks Canada spent \$3.6 million in July 2001 to buy up several resorts. The purchase was made in order to demolish the buildings and restore habitat connectivity for bighorn sheep in the area. Park Managers justified the expenditure by noting that local populations of bighorn sheep were suffering from human overuse of the area. In fact, the population had thrived there for decades despite human presence.⁸ In fact, human presence had helped this particular population to flourish by sheltering it from predators such as cougars and coyotes. In any case, even if this particular bighorn population were stressed by human use, there are many other, more pressing species and habitat concerns. The Species at Risk database of the Canadian Wildlife Service and the COSEWIC species list do not list Big Horn Sheep (*Ovis canadensis*) as being at risk, which means that several million scarce dollars were spent to protect the habitat of a small population of an unlisted and non-threatened species, without even a rudimentary cost-benefit analysis. To add insult to expenditure, the sheep have not cooperated: instead of using the demolished sites to graze contentedly, they still prefer the lawns of the remaining hotels, notwithstanding the proximity of humans.

This should not come as a surprise to anyone who has reviewed the literature about the implementation of wildlife movement corridors in jurisdictions across North America. As Daniel Simberloff *et al.* have demonstrated, “the notion that corridors can’t hurt, even if the possible biological costs could be discounted, is not necessarily always true. Much would depend on the relative costs and benefits of a proposed corridor and the alternative uses of the funds” (1992: 498). Indeed, corridors can transmit contagious diseases, fire, and other catastrophes, as well

as increase the exposure of protected animals to predators, domestic animals, and poachers (Simberloff and Cox 1987). Another problem lies in the paucity of data showing how corridors are used. Where studies do exist, “that an animal uses corridors when these are present need not mean movement without them is impossible, or even less frequent” (Simberloff *et al.* 1992: 497). Finally, Canadians should learn from the example of Florida, where multi-million-dollar proposals for wildlife movement corridors have been implemented despite a lack of data on which species might use a corridor and to what effect (Simberloff *et al.* 1992: 499–500). The enormous cost of establishing wildlife corridors and other rewilding schemes necessarily precludes other conservation options, including the improved management of existing protected areas, and even the establishment of new ones.

The cost of Canada’s own national park rewilding schemes is also high. By fiscal year 2000/2001, in response to the new proactive, restorative mandate handed down by the Panel on Ecological Integrity and enshrined in an amended National Parks Act, Parks Canada had spent \$24.6 million to terminate commercial leases within the national parks, all in the name of ecological integrity (Parks Canada 2001b: 73). Viewed in isolation, the expenditure seems wasteful indeed. As part of a long-range strategy for a Yellowstone-to-Yukon corridor, however, it makes tactical sense (see Wildlands Project 2002).

Unfortunately, promoting this bioregional strategy by raising unfounded public concern about an “extinction crisis” among grizzly bears has unintended consequences. Among them are the serious social, political, and economic implications stemming from listing a species as threatened, either under federal or provincial legislation. This was clear in the debate over the March 2002 recommendation of the Alberta Endangered Species Conservation Committee to the provincial Minister of Sustainable Resource Development regarding the status of Alberta’s grizzly population. Despite reports that Alberta’s grizzly population outside the national parks has almost doubled over the past 14 years, the Committee recommended that the Minister upgrade the bear’s status from “may be at risk” (blue listed) to “threatened” (red listed).⁹ Such an upgrade would require recovery plans, changes to criteria for granting permits, and operating requirements for resource industries. It would also end the current limited-entry hunting activities outside the parks and have a significant impact on guides and outfitters. While Sustainable Resources Minister Mike Cardinal rejected the recommendation at the end of May 2002, the issue will be

revisited after a review of the impact of hunting on Alberta's grizzly bears. On the surface, this would appear to be prudent. In fact, the Minister's decision has sparked outrage from many activists and their sympathizers who are convinced that human activity and development necessarily threatens the species.

Genuine prudence is especially appropriate where the data on which a decision is to be made are questionable. Scientists other than those advising the lobbyists of the Alberta Endangered Species Conservation Committee or the Sierra Club have questioned the historical accuracy of the claim that a hundred thousand grizzlies once roamed a pristine wilderness and the concurrent claim that declining grizzly populations are as low as 1% of their pre-Columbian numbers. They note that the daily journals of early explorers such as Lewis and Clarke provide reports wholly incompatible with the thesis of teeming masses of wildlife. Rather than finding an Eden-like wilderness with wildlife behind every tree, reviews of these journals describe explorers regularly going hungry, because of the lack of game animals (despite expending significant efforts to find and harvest them). Early records further indicate that wildlife was often found only in the buffer zones between warring First Nations. According to these journals and to the archaeological record, First Nations land management techniques and hunting skills so far surpassed what was previously thought possible that they had a significant impact on species makeup of both flora and fauna and often maintained wildlife populations at near extirpation levels in many areas (Kay 1994, 1995; Kay and White 1995; Kay *et al.* 1999; Kay *et al.* 2000; Shelton 2001: 188 ff). For example, the recent discovery at a site near Cardston, Alberta of a prehistoric horse skeleton and two 11,300-year-old spearheads from which protein residue of the ancient horse has been recovered supports this thesis of "aboriginal overkill" and reinforces the view that human hunting as well as climate change at the end of the last Ice Age led to the extinction of this creature (University of Calgary 2001). Managing grizzly bears so as to maximize population counts ignores the natural and historic influence that humans have always had in shaping the landscape of North America (Flannery 2001).

Managing coexistence

ESGBP researchers have argued that maintaining a viable population of grizzly bears "is an enormous challenge . . . because of the preconceived expectation that National

Parks are recreation areas for millions of people" (Gibeau 2000: 54). This "preconceived expectation," however, has a history: Canada's national parks were developed and have been managed as tourist destinations and recreation areas for over a century. Furthermore, the National Parks Act (Parks Canada 2000a, Sec. 4.1) states that the "national parks of Canada are hereby dedicated to the people of Canada for their benefit, education, and enjoyment," which constitutes a legal invitation for visitors to visit and take their recreation in those parks. The 1997 Banff Management Plan (Section 3.1: 12) calls the park a "tourist destination" and Parks Canada documents, web sites, and staff presentations all agree that the parks are "A Place for Nature [and] A Place for People" (Parks Canada 2001a).

When managing coexistence of grizzly bears and humans, there is no reason to think that a one-size-fits-all management approach will work with grizzlies any more than it does with other wildlife species or with humans. Proper research and careful thought must go into developing not just park-specific, but site-specific (and possibly bear-specific) management plans. Site-specific management plans can be designed and, in fact, have been implemented in Alaska and British Columbia to teach humans to respect the boundaries and needs of bears, and teach bears to respect the space of humans.

Proof that coexistence between bears and humans is possible even at close range can be seen in the examples of McNeil River (Herrero 1985; Shelton 2001), Brooks Camp (Alaska Outdoor Journal 2001; Shelton 2001), and Anan Creek (USDA Forest Service 1995, 2001). At all three sites in Alaska, a limited number of visitors in designated viewing areas are allowed to approach and view bears within 50 yards, a significant distance because the presence of humans or other bears within closer proximity is likely to cause a grizzly to act aggressively (Herrero 1985).

While it took over 10 years for the McNeil River bears to acquire their pattern of habituation, only two bears were killed in the process; this site has existed as a wildlife viewing area since 1973 without the need to extinguish human use. Nonetheless, a number of factors make the site unique and so an imperfect analogue to the situation in the central Rockies: "the human presence is small and predictable; the area is generally open ground where bears can see all around themselves; and the bears don't interact with fishermen, or hikers, and campers, or a nearby town or village" (Shelton 2001: 192).

First Nations peoples claim to have used the Anan Creek area for "hundreds of years" (USDA Forest Service 1995: 15). Undoubtedly, grizzlies have been using the

area for just as long. Currently, the site receives up to 90 visitors per day, with as many as 25 people viewing the resident bears at a time. Yet, despite a sustained increase in human visitors to the area, there is only one recorded instance of a brown bear being killed (1991), after charging a videographer, and one other instance of a brown bear charging a Forest Service Employee (USDA Forest Service 1995: 15).

Because the grizzlies in the Brooks Camp area are “habituated but slightly aggressive” (Alaska Outdoor Journal 2001; Shelton 2001: 192), there are relatively strict rules governing use by visitors. For example, fishermen are encouraged to travel in large groups and use pepper spray when confronted by bears. Area wardens use radios to maintain contact with fishermen and have them leave the area when a bear is approaching.

Olson (1993) and Olson *et al.* (1997) showed that use of Alaskan salmon streams by grizzly bears was better determined by their ability to tolerate humans than by the more traditional categories of age, sex, and maternal status. Their work demonstrated that non-habituated adult grizzly bears reduced activity at an Alaskan salmon stream in response to an extended lodge season. In contrast, habituated adult bear activity remained substantially unchanged.

While these examples are not strictly analogous to the central Rockies, they do provide evidence that habituation and co-existence between humans and bears is possible even at close range without the need for large numbers of bears to be relocated or killed. With examples such as these, one can see that one of the most important factors in dealing with co-existence is education of *both* the bears and humans. Such education necessarily entails a level of habituation on the part of the bears.

This argument leads to the conclusion that humans need not be removed from the back country or from other natural areas. However, human access will require responsible conduct from those using the natural areas. In his report to the Department of Fisheries and Oceans [DFO], *Managing Human/Bear Conflict at the DFO Babine River Counting Fence and Living Compound*, Shelton (2001: 181 ff) noted that a certain level of habituation will, in fact, provide a degree of security and safety for both bears and humans. This report was intended to instruct DFO employees on ways to deal safely with the increasing number of bears that they were encountering at the Babine River salmon counting fence in northern British Columbia. His recommendations focus on teaching both the DFO employees and the local bears where they

should expect each other to be, instructed employees in the use of various deterrent methods such as electric fencing, spray, and firearms, and set usage times for both humans and bears.

As with the Alaskan examples, the Babine River situation is not wholly analogous to the situation in the central Rockies. Therefore, Shelton’s suggestions cannot simply be copied as a tool for managing human use in the back country of the mountain parks. Neither the British Columbian nor the Alaskan examples are meant to act as templates for changing mountain park management schemes. Shelton’s report simply provides additional evidence that close-range coexistence between bears and humans is possible, and that there are professionals who are actively and creatively attempting to find ways to bring it about. Their work, however, goes on outside Canada’s national parks and beyond the control of Parks Canada. Moreover, it seems to have been largely ignored by Parks Canada advisors.

Can the presence of humans help bears?

Using the more common-sensical understanding of the precautionary principle advanced by Goklany (pp. 34–35 above), we can revisit the opinion that the “combination of habituated bears using lower quality habitats and demonstrating higher movement rates suggests less energy available for growth and reproduction” (Gibeau 2000: 4). To begin with, it is possible that habituated bears may have been displaced into marginal habitats by dominant bears. After moving into this marginal habitat, their movement rates would have necessarily increased in order to locate sufficient forage. An increased rate of movement would likely have increased the rate at which they encounter humans, familiarizing them with human presence, causing them to become “habituated.”

“Habituation” can also be seen as an adaptive survival trait. That is, some female grizzlies in the CRE may have become habituated as a side-effect of using human-influenced habitat to help increase the survival rates of their offspring. Research indicates that sows with cubs may use marginal or human-influenced habitat as a means of avoiding dominant males (Blood and Materi 1998). In the central Rockies, sow grizzlies frequent areas of high human use, such as the Lake Louise area and roaded areas. Furthermore, they do so without necessarily becom-

ing food-conditioned. The relevant evidence has been noticed by the ESGBP researchers, though its significance was ignored. For example, Gibeau noted that

social structure may also have a bearing on spatial distribution of a bear population. In Yellowstone National Park, Mattson *et al.* (1987) demonstrated that cohorts of subordinate bears were found in poor-quality habitats near developments, displaced by more dominant classes, particularly adult males. McLellan and Shackleton (1988) also determined that adult males used remote areas whereas adult females and some subadults used areas closer to roads. While my results pointed to differential use by sex and age, I was unable to determine whether this distribution is a natural phenomenon or the result of intense competition for space with humans. (2000: 34)

In common-sense language, the presence of humans in areas such as Lake Louise may be used by sows and their cubs in order to avoid dominant males. The biological evidence supports this interpretation (Mattson 1990; Blood and Materi 1998). Using the precautionary principle of “prudence in the face of uncertainty” and “erring on the side of preservation,” when the evidence indicates that females use marginal habitats and the presence of humans as a form of cover from dangerous adult males, then it appears likely that restricting human use could harm survival rates within the adult female cohort.

The probability of harm necessarily increases when the removal of human influence encourages “wary” adult males to use habitats they had previously chosen to avoid because of human presence. This change in male grizzly behaviour would then force females out of known habitats into new, marginal ones, likely causing decreases in fecundity and survival and certainly causing a disruption in their habitat use. Moreover, a decrease in female survivability would almost be guaranteed because the most recent ESGBP numbers indicate an almost perfect, 99% rate of adult female survival (Herrero *et al.* 2000: 30). Even if one discounts the recent trend in female survivability as a statistical anomaly and relies on the longer-term survival rate of between 90% and 95% (Herrero *et al.* 2000: 29), these still relatively high rates would present an excellent argument for precaution. With little room for increase and a great deal of room for decrease in the adult female survival, tinkering with a management scheme that clearly works (as evidenced by adult female survival rates of

90% to 99%) must be prohibited by application of either the extreme preservationist version of the precautionary principle or the more moderate precautionary principle of Goklany. There is nothing paradoxical in the notion that the presence of humans has, in fact, helped maintain the current high levels of survival. As all the authorities attest, bears are highly adaptable and they have clearly adapted to humans.

For conservation biologists, however, all the arguments regarding the application of the precautionary principle or the need to avoid Type II errors, move in a single direction: removing humans from parks and other natural areas. Where human presence may mitigate some environmental harm, in this case maintaining or increasing the survival rates of adult female grizzlies, the precautionary principle is abandoned and ignored. It seems evident, therefore, that the objective is simply to restrict or remove humans; the discussion of Type II errors or the precautionary principle is rhetorical camouflage.

If one revisits ESGBP arguments in light of the above considerations, they seem to be at variance with standard scientific thinking. ESGBP researchers strongly advocate maintaining wariness, which in terms of the dichotomy between wary and habituated means keeping bears non-habituated. When transformed into public policy by Parks Canada, the direction of its effort is towards “managing for wary grizzly bears” (Jalkotzy *et al.* 1999: 9). There is a vital difference, however, between managing for wary bears and managing for wary *behaviour*.

As we have indicated above, managing for wary behaviour is possible because it can be observed in hunted bear populations or those bears habituated through aversive training. But, focusing management on wary bears would be difficult, because all bears exist on a continuum somewhere between wary and habituated and the same bear can vacillate widely between wary and habituated behaviour, depending on its environment—as ESGBP researchers themselves acknowledge (Herrero 1985: 15; Gibeau 2000: 10). Moreover, managing for wary behaviour would benefit the CRE grizzly population because it would encourage them to avoid direct contact with humans while allowing them to use human-influenced habitat.

It is probably true that, in specific and limited circumstances, grizzlies that have been sheltered from human influence may have a natural wariness of humans that helps to reduce conflict between humans and bears (Norkin 1997). However, it is far too late to apply such an experimental strategy to the CRE population. Such a strategy would require sheltering CRE grizzlies from

human influence for several generations of bears. Absent the implementation of mass human relocation in accord with schemes such as those advocated by the Wildlands Project, that is not going to happen.

Fortunately, more than the logic of a Darwinian adaptive survival strategy is involved in disputing the ESGBP notion that “wary, healthy” bear populations require drastic reduction or curtailment of human use in the parks. In sharp contrast to ESGBP reports, British Columbian researcher Gary Shelton argues that bears are not by nature “shy nocturnal animals” that avoid humans whenever possible:

Grizzlies with that type of [wary] behaviour have had significant mortality by humans, who first eliminated bears with higher levels of day activity and aggressive behaviours and modified the behaviour of surviving bears that had family members killed, or have been wounded or dosed with shotgun pellets . . . It takes 30 to 40 years of significant human influence before most females in a grizzly population are teaching their cubs to be nocturnal and to run when they see, hear, or smell a human. (2001: 85)

Rather than being naturally wary, wariness is actually a learned behaviour, a defence from human threats. Consequently, Shelton argues that hunting pressure and aversive conditioning teaches bears (even “habituated” bears) to avoid humans. This argument, which also accords with common sense, contradicts the hypothesis of a “natural” wariness that ESGBP research argues is best achieved through seclusion from human influence (Gibeau 1998, 2000).

As noted above, several groups have recommended that the status of Alberta’s grizzly population be upgraded to “threatened.” One of the implications of a changed designation would be an end to limited entry hunting. This could have unintended consequences for grizzly bear management in Alberta, as evidence indicates that the removal of hunting pressure on a grizzly population encourages both a loss of wariness and a corresponding increase

in negative encounters between bears and humans. According to Shelton, the decrease in hunting pressure on grizzly populations during the moratorium in British Columbia on hunting grizzly bears encouraged a much bolder response by grizzlies toward humans:

For a very long time, we had levels of mortality and types of mortality on grizzly bears that suppressed their numbers and made them fearful of humans. During the last 15 years, that influence has been reduced to the point that most bear populations are increasing, and many grizzlies no longer fear people. They are reasserting their position as a dominant species. (2001: 182)

Literature from Eurasia also supports the hypothesis that bears are more wary when they are hunted than when they are protected (Norkin 1997).

David Garshelis has observed an additional irony: while most legally protected bear populations appear to be declining, most hunted populations are on the rise. He explains:

Historically . . . in both North America and Europe, managed hunting has been an effective system for protecting bear populations. It has worked because it has enlisted a clientele interested in ensuring continued abundance of the resource. It has also worked because, for species such as bears that can be a nuisance and a threat, it transfers the killing of animals from the general public to a smaller group of people (i.e., the hunters). (Garshelis 2002: 22)

In conclusion, while aversive training techniques and hunting pressure on grizzly populations would of course habituate bears to people, the type of wariness so induced by humans is protective and beneficial for both bears and people (Montana Chapter of the Wildlife Society 1999). So far as the CRE grizzly population is concerned, habituation is not the issue. This population is already habituated to some extent; the issue is to ensure the right kind of habituation.



Conclusion

The preservationist movement in North America has embraced a new mission-oriented version of biology. Supported by tax dollars and generous government grants and by vocal and effective international environmental interest groups and lobbyists, conservation biology has had a distinct impact on the management of Canada’s national parks. The basis of conservation biology is the “fundamental shift in ethics” (Gibeau 2000: 49) toward a new understanding of what natural resources and parks are for. Even so, because conservation biologists employ the language and concepts possessing considerable phonemic overlap with other branches of wildlife science, conservation biology appears similar to standard or ordinary wildlife biology. Only when the end purposes are brought into focus do the differences between the two appear.

The issue that we take with conservation biology is not that its practitioners have preconceived opinions. We believe it is reasonable to expect that research claiming to be scientific, that is funded by tax dollars, and that has a direct impact on the management of publicly owned lands would be carried out in such a way that the biases of researchers have limited influence on their findings. As Friedman (1991, 1997) argued, researchers who advocate theories that lead to significant changes in management policy should act as the strongest critics of their own work.

The ESGBP researchers asked that “interested readers ... carefully examine the strengths and limitations of their data.” This is a conventional scientific protocol for which the present *Critical Issues Bulletin* is a response. We have argued that ESGBP research has allowed an admitted and systemic preservationist bias to influence its research on grizzlies and, no doubt, on other large carnivores in the mountain national parks. This bias has encouraged policy recommendations, including restriction of human use and extension of the authority of government and interest groups beyond existing park boundaries to privately owned and leased land outside parks and other protected provincial lands. We have shown that the ESGBP researchers themselves have failed to meet basic scientific require-

ments. By invoking a talismanic “precautionary principle,” they deliberately advance questionable findings based on incomplete methodologies, flawed models, and highly debatable assumptions as the foundation for promoting restrictions on human activities, particularly in Canada’s national parks. These restrictions are advanced initially as being necessary to ensure the preservation of biodiversity. Subsequently, their supporters, who are active in environmental lobby and litigation groups, further bias these already questionable assertions by widely publicizing selected portions of the research. Couching their reviews of the abbreviated research findings in lurid headlines and quasi-scientific language, they offer a stark and alarming choice between forced restriction of human activity and environmental desolation. However one describes the entire complex strategy, from developing wildlife population estimates on the basis of dubious assumptions to a multi-pronged litigation strategy, it is not science.

Contrary to accepted conventions of scientific procedure, which require rigorous testing of hypotheses, ESGBP researchers have stated the opinion that “the ultimate test of any applied research program will be if scientific findings are used to inform either policy process or management practices” (Gibeau 2000: 50). In this light, they have easily passed their ultimate test. If the “applied research program” described in this paper is as scientifically questionable as we have argued, the cost of translating it into wildlife management practices are bound to be inordinately high and the benefits correspondingly low.

This *Critical Issues Bulletin* has brought into focus a number of criticisms of ESGBP research and modeling efforts. Before any further ESGBP research is used as an aid in developing land management policy, and before any further tax funding is devoted to this research, it would be prudent for ESGBP researchers to provide information and data relative to the concerns we have raised. If the ESGBP is going to continue to offer recommendations for policy, it is imperative that their science be credible. In order to enhance this credibility, we recommend the following:

- Given that the ESGBP has now collected the targeted 100+ years of reproductive data, we recommend that their entire *raw* data set, modeling software, and parameters be placed in the public domain, not least of all because their research has been substantially funded by federal and provincial tax dollars.
- The results of PHVA simulations of grizzly bear populations in the central Rockies should not be used to guide any actual management regimes until the data, the assumptions, and the methodology are reviewed by independent modeling specialists.
- Future use of habitat effectiveness models and security areas analysis should be constrained by the necessary inclusion of a cost/benefit analysis to determine if the implementation of the findings derived from the models will cause greater damage to provinces, regions, or communities than alternative management actions.
- These models should only be used as one of a group of tools in a broad suite of land and wildlife management approaches. No single tool should play as determinative a role in the management of Canadian National Parks as the habitat effectiveness model now does.
- Parks Canada should define and provide specific guidelines for the implementation of the precautionary principle. The current ambiguity surrounding its definition and the preservationist tenor to its past application requires that a coherent framework (such as provided by Goklany 2001 or Lomborg 2001) be applied and implemented. Economic and other social science information is needed in order to assess the costs and benefits of alternative management actions.
- Parks Canada should renew its commitment to both human use and environmental protection of the parks.
- While some communication with landowners and managers adjacent to the national parks may be appropriate, Parks Canada's "ecosystem management" approach should not be used to expand their management prerogatives beyond national park boundaries. Likewise, any "adaptive management" strategies must be tempered with the need for legal and administrative certainty for park visitors and service providers.

Credible, independent peer-reviewed science, along with a broad suite of management tools and developing technologies can provide the necessary apparatus to understand bear biology and models. When this understanding is rooted in a management approach that emphasizes individual responsibility, choice, and the education of bears and humans, both populations will be better served.