Re-connecting grizzly bear populations: Prospects for participatory projects

Steve Primm[1,3] and Seth M. Wilson[2]

[1]*Gravelly Range Grizzly Project, Northern Rockies Conservation Cooperative, Ennis, MT 59729-1483, USA*
[2]*University of Montana, College of Forestry and Conservation, Missoula, MT 59812, USA*

Abstract: Small, isolated populations of grizzly bears (*Ursus arctos*) typically have poor survival outlooks. Persistence of such populations will depend on either intrusive, resource-intensive management, or re-connection with other subpopulations through linkage habitat. Much of the discussion of linkage habitat focuses on ecological information. We cannot overlook, however, the cultural and political dimensions of these landscapes. People who have lived with recovering and expanding populations have valuable insight and practical knowledge that should inform management and conservation programs. Thus, these areas provide good prospects for designing innovative programs adapted to local situations. Capitalizing on such opportunities requires a systematic approach to understanding social context and involving local people in research and planning. Small-scale, participatory projects can provide models for subsequent conservation projects and build political support by demonstrating success. This paper provides a conceptual framework and a general strategy for achieving linkage habitat conservation. Lessons are drawn from a variety of emerging projects.

Key words: connectivity, corridors, fragmentation, grizzly bear, linkage habitat, participation, *Ursus arctos*

Ursus 15(1) Workshop Supplement:104–114 (2004)

Grizzly bears in the Rocky Mountains of the conterminous United States exist in 4 apparently disjunct populations. Two of these populations (Greater Yellowstone and Northern Continental Divide) may be robust. The other 2 (Cabinet–Yaak and Selkirk) are confined to small isolates of habitat. The latter 2 populations are unlikely to achieve even a minimal level of viability within their present ranges, which are capable of supporting only small numbers of bears. The 2 larger populations have far more habitat, but also may face threats to long-term viability (Craighead et al. 1995, Miller and Waits 2003).

All the grizzly populations in the lower 48 states, then, would likely benefit from being inter-connected via areas of suitable habitat (U.S. Fish and Wildlife Service [USFWS] 1993). Many researchers and conservationists have proposed such connecting habitat, variously labeling the idea as "linkage zones," "habitat linkage corridors," and other terms (Bader and Bechtold 1996). Servheen et al. (2003) discuss this proliferation of concepts and call for clear, descriptive terminology. We use the term "linkage habitat" to describe areas that (1) can fulfill some portion of an animal's annual survival needs, and (2) occur between substantially larger areas of habitat, forming a connection of similar habitat attributes through an otherwise dissimilar matrix. "Linkage habitat" emphasizes that the area must provide habitat, especially at scales well beyond daily or even annual movement distances; the modifier "linkage" denotes that the area must connect otherwise disjunct blocks of habitat. Recent work by McLellan and Hovey (2001) supports this interpretation of connectivity, emphasizing that linkage habitats may need to serve life history needs of grizzly bears over multiple years for effective dispersal to occur.

In this paper, we argue for localized, participatory projects to conserve linkage habitat for grizzlies and other wildlife. We provide an overview of the benefits of re-connecting fragmented populations through linkage habitat. Next, we discuss the socio-political context of grizzly bear conservation; this understanding is necessary because re-connecting grizzly bear populations will require extensive work on private lands, where regulatory options are few (Wilson 1996). Moreover, grizzlies appear to be a polarizing symbol in a broader conflict of values over resource conservation and land use, making cooperation difficult (Mattson et al. 1996, Primm 1996).

[3]sprimm@3rivers.net

We also examine the task of designing and implementing participatory projects for linkage habitat conservation. By genuinely including citizens in conservation plans, participatory projects can make progress on local scales, while helping diminish value conflicts at broader scales. We specifically recommend dialogue to integrate the diverse human values represented in grizzly conservation. These processes should be more than talk and should aim for tangible conservation progress. We conclude by drawing lessons from emerging community-based conservation projects that provide examples of how linkage habitat efforts may unfold.

Linkage habitat: Basic considerations and benefits

Linkage habitat may have several important benefits for wildlife populations. A population's persistence often depends on variability in rates of growth (Pimm et al. 1988, Lande 1993). For small, recovering, and expanding populations, stable, positive growth rates are perhaps more important than any particular numeric threshold (Lande 1993). By connecting animals to a greater quantity and diversity of habitat resources, linkage habitat can facilitate adaptation to changing environmental conditions, such as drought or loss of a key food source. These adaptations can in turn stabilize growth rates. Linkage habitat can also provide a growing population with access to vacant habitats, allowing growth to continue. Dispersing animals from one population can help reverse localized declines in another, a concept known as demographic rescue (Noss et al. 1996). The rescue effect may manifest itself simply as increases in numbers of animals in the population at risk, or it could make the population more stable through the characteristics of the individuals immigrating (e.g., breeding-age males immigrating to a population heavily skewed toward females). Immigrating individuals may also contribute to genetic diversity in populations otherwise at risk of inbreeding depression (Miller and Waits 2003). Although some researchers (e.g. Caughley 1994) caution against overemphasizing inbreeding concerns, Lacy (1997) provides evidence of low genetic variability contributing to extinctions in the wild.

Linkage habitat for Rocky Mountain grizzly bears poses special challenges. The landscape for grizzlies is often naturally fragmented. Broad, intermountain valleys are often mostly grassland, shrub-steppe, and other non-forest vegetation. These areas have limited security or hiding cover for bears and can form dispersal barriers between mountain ranges (cf. Lidicker 1999). In addition, whether they are forested or open, riparian areas in valleys were the first land settled by homesteaders and early ranchers (Jordan 1993). Thus, linkage habitat is likely to bring grizzlies close to people (Servheen et al. 2003). Grizzlies pose some risk to property, livestock, and human safety. Any proposal to bring them nearer to people is likely to be controversial. Finally, linkage habitat to re-connect grizzly populations in the Rockies will have to span great distances. Some linkage efforts—such as the Swan Valley in northwest Montana—bridge moderate distances (<15km) between 2 adjacent mountain ranges (Pelletier and Servheen 1995). At the other extreme, the Greater Yellowstone grizzly population is at least 200 km from its nearest neighboring population in the Northern Continental Divide Ecosystem. Linkage habitat on this scale would need to provide year-round habitat for resident bears, because the distance to other major habitat complexes exceeds normal dispersal distances (McLellan and Hovey 2001).

Conservation planning at such a broad scale requires relevant and reliable scientific information on habitat suitability, distribution, behavioral ecology, and the location of possible mortality sinks (Carroll et al. 2001). Perhaps more importantly, efforts at this scale have the potential to affect large numbers of people in many communities. So in spite of potential ecological benefits of re-connecting grizzly populations, many contextual challenges must be acknowledged and understood.

Socio-political context of grizzly conservation

Linkage habitat may have to span large areas to re-connect grizzly populations. Communicating with and involving many citizens over such an expanse is a major challenge. Rumors, distortions, and overt efforts to rally opponents may easily outpace accurate, proactive communication about linkage efforts (e.g., Finley 2001). Complicating matters, grizzlies, along with wolves (*Canis lupus*) and other large mammals, have become symbolic focal points in a widespread political conflict (Clark 2002). To illustrate, numerous counties in grizzly range have passed resolutions and ordinances against grizzly bears (Urbigkit 2002). Some of this opposition derives from the inherent danger that grizzlies can pose to humans, but there is also fear that grizzly conservation will lead to economic losses. Some opponents even claim that the intent of grizzly conservation is to curtail commercial land use. One observer warned that grizzlies will be "used by professional litigants to

close the forests to sustainable logging, grazing, and recreation" (Oliveria 2000). A Wyoming rancher asserts, "the enviro groups are pushing to place these large predators everywhere because their goal is to end multiple use" (Ingalls 2001).

Interwoven with these objections are strong, underlying themes of cultural and political conflict. Many opponents of grizzly conservation believe that a distant, hostile culture is imposing these reputedly dangerous, impoverishing animals on them. A Salmon, Idaho resident at a hearing regarding the proposed reintroduction of grizzlies to the Bitterroot Ecosystem epitomized this point of view:

> We're fed up with you guys sitting somewhere back in the East and deciding what's going to happen out here... We're sick and tired of having stuff shoved down our throats by people back somewhere who think they're better than us (from Burns 1997:B1).

Meanwhile, easterners like the editors of the *New York Times* embraced the proposed reintroduction, in particular because of its potential for re-connecting Glacier and Yellowstone grizzly populations (New York Times 2002).

Grizzly bears' status as polarizing symbol impedes resolution of the practical problems of bear–human coexistence. Small-scale, participatory conservation efforts, however, may make progress because they deal with small sets of political actors and provide opportunities for accurate communication and integration of values (Meyer 2001). Borrini-Feyerabend (1997) asserts that diverse, decentralized conservation initiatives with broad local support are more stable and sustainable than gains at the national level, which may be undone with the next election. Furthermore, successful co-existence between people and grizzlies requires many individuals to integrate bear-safe behaviors into their everyday lives. Implementing such practices relies on voluntary compliance and public goodwill (Pelletier and Servheen 1995). Voluntary compliance and informal enforcement (e.g., peer pressure) are more likely if citizens are actively involved in developing programs (Meyer 2001).

Foundational elements of conserving linkage habitat

There are few, if any cases where grizzly populations in the Rocky Mountains must be re-connected immediately (<5 years). The isolated Yellowstone grizzly population, for example, may be decades away from experiencing inbreeding depression (Miller and Waits 2003). If any population required immediate demographic or genetic augmentation, the situation would be severe enough to warrant translocations of bears from other populations. Thus, we have adequate time to pursue strategies with good chances of long-term success. There are cases, however, where the pace of development in linkage habitat may preclude connectivity in the near term (<10 years), heightening the urgency of action (Servheen et al. 2003).

Re-connecting grizzly bear populations is a complex ecological, social, cultural, and political process. Citizen participation complements other important elements of linkage habitat conservation (Fig. 1). Many efforts are currently underway to assess priority areas for habitat connectivity and landscape scale conservation for a wide array of taxa (Ruediger et al. 1999, Servheen et al. 2003). Some areas are more important ecologically than others for reconnecting grizzly populations, and it is important to prioritize these areas for action (e.g., Bader and Bechtold 1996, Carroll et al. 2001, Serhveen et al. 2003). Remote sensing, GIS (geographical information systems), conservation biology, landscape ecology, and local knowledge systems all have roles in identifying and conserving important linkage habitats (Forman 1995, Berkes and Folke 1998, Fig. 1). This conceptual framework illustrates that citizen participation does not supersede other facets of linkage conservation and, in fact, may enhance other components.

Sequential projects beginning in occupied habitat

The strategy we promote consists of small-scale participatory projects designed to lead cumulatively to functioning linkage habitat. These projects begin on the edge of occupied grizzly habitat and work outward from areas where natural expansion is occurring. The advantage to beginning with occupied habitat is that citizens in such areas are already accustomed to living with grizzlies. These areas are a rich source of lessons and, in some cases, successful practices for co-existence. In addition, by starting where bears already live, linkage conservation efforts may not generate as much opposition as proposing grizzly bear conservation in unoccupied areas.

Small-scale projects in such areas would provide valuable learning opportunities for many parties. Being small-scale, they provide low-stakes settings for trying out innovations. Scientists, managers, and other practitioners (e.g., ranchers, loggers) have the opportunity to experiment with management practices for co-existence with re-colonizing grizzlies. Participants learn valuable

process and communication skills through participatory conservation efforts. These small-scale projects also could increase political support by demonstrating successful restoration of grizzlies to linkage habitat—an important counter balance to negative symbolic images of grizzlies in the political arena. Political support may make subsequent projects in other areas easier to implement (Weick 1984). By building projects sequentially on the knowledge base and political goodwill of predecessors, we may eventually restore connectivity over large expanses.

Project areas tiered to human communities

A key element of linkage habitat conservation is to scale linkage habitat projects to identifiable human communities, on the scale of watersheds, valleys, counties, U.S. Forest Service Ranger Districts, or other meaningful geographic or political units. This project scale is sensible because citizens are likely to be more engaged in participatory efforts about landscapes they identify with and know well (Cestero 1999). Also, for participation to be logistically feasible, participatory projects should not place excessive burdens, such as long travel distances, on citizens. Participatory projects should also include non-local people who are affected. This category could include recreationists and hunters who use local public lands but reside elsewhere. More broadly, citizens from outside the area could be represented by non-governmental organizations with similar goals (Wondolleck and Yaffee 2000).

Social context mapping

A second critical element is a working knowledge of the linkage habitat's socio-cultural attributes. These attributes include human demographics and components of the local economy. Understanding shared attitudes, beliefs, and values in the area is important for understanding people in an area. Identifying individuals who are influential in various sub-cultures of the area is also important. These individuals may not be elites in formal positions, such as county commissioners (Clark 2002). Another important facet is the area's civic institutions (e.g., the Lion's Club, churches, and informal organizations). Institutions devoted to natural resources (e.g., watershed conservation groups, Conservation Districts, and grazing cooperatives) are particularly important, as we explain next.

Integration with existing efforts

Establishing wholly new efforts without first exploring existing institutions is usually a mistake. Citizens who could take a constructive role in solving conservation problems often already devote a good deal of their discretionary time to civic activities. New participatory efforts that are not integrated with existing institutions may fail to engage this limited pool of people simply because they are too busy to take on new activities. Worse, people involved with established institutions may see new efforts as competition or as a negative judgment on the usefulness of their own labors. Overlooking existing institutions may either create active opponents or simply deprive the new initiative of the skills, leadership, and legitimacy of key individuals (Wondolleck and Yaffee 2000). Similar cautions apply to cooperating with government agencies such as the U.S. Forest Service or state wildlife agencies. Although a number of observers warn against agency domination of participatory conservation (Cestero 1999, Dryzek 2000), it is clear that agency staff have critical roles to play, both formally and informally. Not only do agency managers have extensive contact with local people, their perceptions and values may help or hinder participatory processes.

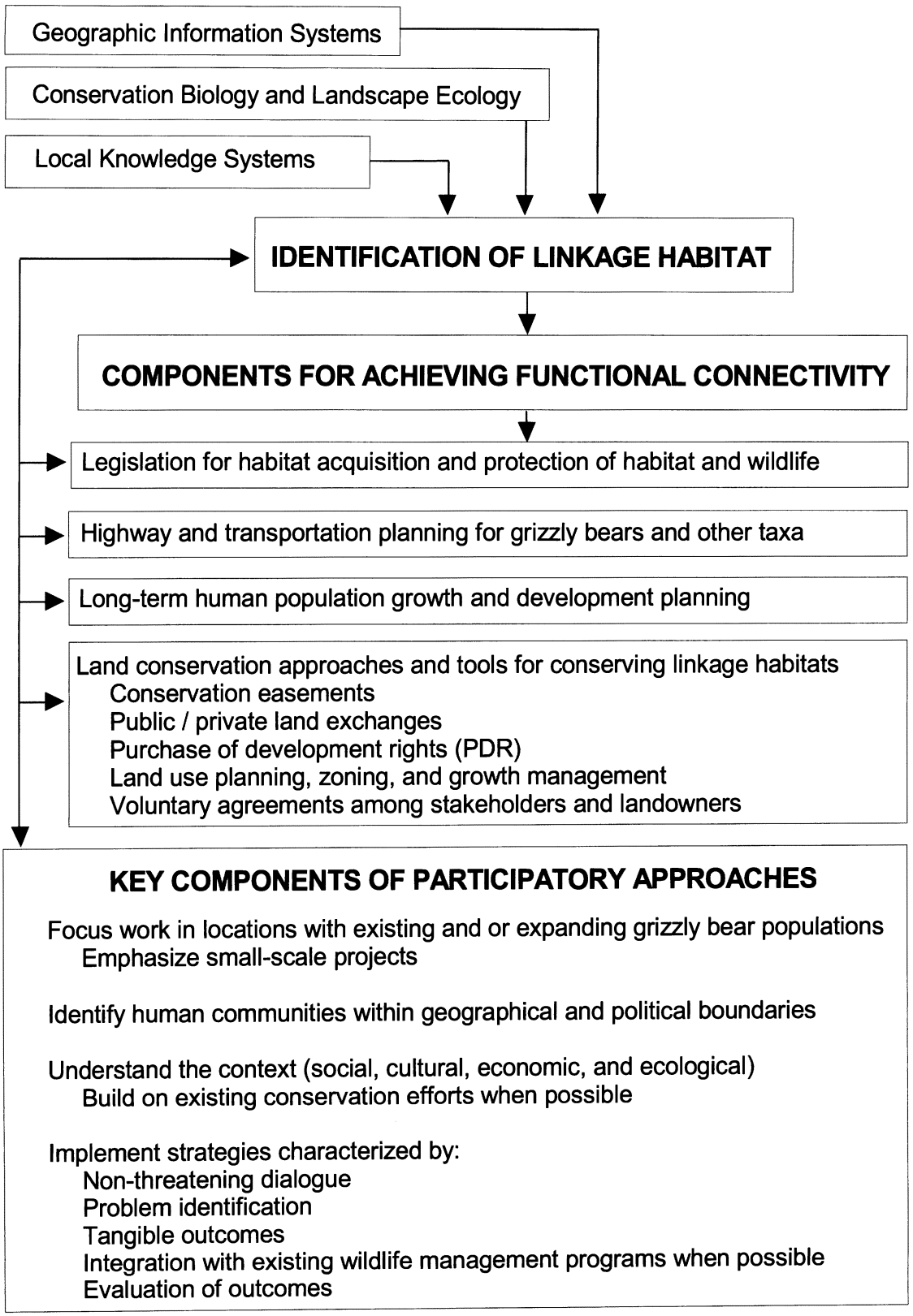
Initiating participatory conservation

Once the foundational elements of linkage habitat conservation are in place, the remaining challenge is to design and implement participatory conservation strategies to produce tangible outcomes. This task transcends disciplinary boundaries and requires skills that may be in short supply (Wilshusen 2000). We discuss this task in detail because, in light of the multiple variants of participation that exist, it is important to specify clearly what kind of participation we recommend (Cestero 1999).

Participation in perspective

Opponents of participatory conservation fear that such efforts will replace a transparent—even if divisive and cumbersome—system of laws and procedures with small-scale deal making among unaccountable parties (Wondolleck and Yaffee 2000). Thus, it is important to place participation in its socio-political context and to specify guidelines for effective, equitable processes.

Participation in public decisions is, in many ways, the essence of an open society. Consent of the governed is the basis of political legitimacy in modern democracies. Ideally, consent of the governed takes shape in a participatory way, through the collective reasoning of citizens, with ample and accurate information (Cohen 1998). As societies grow larger and more complex, however, collective reasoning becomes a great challenge. Increasing complexity of issues and shifting


Geographic Information Systems
Conservation Biology and Landscape Ecology
Local Knowledge Systems
IDENTIFICATION OF LINKAGE HABITAT
COMPONENTS FOR ACHIEVING FUNCTIONAL CONNECTIVITY
Legislation for habitat acquisition and protection of habitat and wildlife
Highway and transportation planning for grizzly bears and other taxa
Long-term human population growth and development planning
Land conservation approaches and tools for conserving linkage habitats
Conservation easements
Public / private land exchanges
Purchase of development rights (PDR)
Land use planning, zoning, and growth management
Voluntary agreements among stakeholders and landowners
KEY COMPONENTS OF PARTICIPATORY APPROACHES
Focus work in locations with existing and or expanding grizzly bear populations
Emphasize small-scale projects
Identify human communities within geographical and political boundaries
Understand the context (social, cultural, economic, and ecological)
Build on existing conservation efforts when possible
Implement strategies characterized by:
Non-threatening dialogue
Problem identification
Tangible outcomes
Integration with existing wildlife management programs when possible
Evaluation of outcomes

values—both manifest in grizzly conservation—further compound the difficulty of developing informed collective opinions (Primm 1996). Decision makers cannot accurately gauge the will of the people, because no clear expression thereof emerges. Special interests fill this void with their own demands, claiming that they are acting in the common interest (Dahl 1994). Existing decision-making processes (e.g. legislation, litigation, and administrative processes like Environmental Impact Statements) are weakened by our inability to articulate a set of shared values and do not appear to offer a way forward (Clark 2002).

This situation has led many to seek improvements through participatory processes. These range from national-scale projects like deliberative opinion polls (Fishkin and Laslett 2003) to small-scale efforts involving only a few participants (Cestero 1999). Participation is appealing because it may develop reasonable solutions that satisfy a broad range of interests (Dryzek 2000). Put differently, participatory processes could develop a clear rendering of the consent of the governed. It is unrealistic, however, to expect that all forms of participation will lead to such results. These processes must have clear objectives and justifications and be carefully designed to reach positive outcomes.

Guidelines for effective and equitable participatory conservation

We begin with the premise that grizzly conservation, like many other public policy problems, is fundamentally a conflict of human values, compounded by emotionally charged symbolism. Participatory processes, then, should primarily aim to resolve these value conflicts to the extent possible. With this objective in mind, we recommend dialogue as the appropriate tool for resolving value conflicts. Dialogue is a particular communicative practice, not a colloquial synonym for discussion, collaboration, negotiation, or consensus. It is a process of reasoning together. Dialogue's elements include an obligation to make one's reasoning and assumptions as clear as possible, equality among participants, and empathetic listening (Yankelovich 1999). The idea is to explain and explore assumptions behind our opinions in a non-confrontational environment, free from social intimidation or emotional manipulation. It is a search for shared values as well as an effort to understand the viewpoints of others. In most cases, dialogue requires a skilled, neutral facilitator.

A common objection to participatory conservation is that it unfairly cedes authority to local people, excluding others who have a right to participate. Participation, however, need not be synonymous with local control. In fact, wholesale delegation of authority may undermine dialogue. If participants have *carte blanche* decision-making power, dialogue may be cut short and calls for explanations can be ignored. As a result, underlying value conflicts may not be carefully explored and resolved. This outcome is not much of an improvement over the status quo, because it merely transfers power to a different group of people. Rather than improving methods of discovering what the public truly wants, local control merely changes the people in charge. It does not accomplish the aim of developing reasoned, durable decisions. Thus, experts recommend a firewall between dialogue and decision making, to ensure that what emerges from participatory processes is informed by the better argument (Yankelovich 1999, Dryzek 2000). The dialogue–policy firewall may also bolster the sustainability of participatory processes by avoiding the legal pitfalls of delegating statutory authority (Kagan 1997). These guidelines—high-quality dialogue, professionally facilitated, with no direct link to public decision making—should lead to effective and equitable participatory processes, as measured by progress toward resolving long-standing value conflicts.

Tangible conservation outcomes

Participatory problem solving should not be all talk. These processes can and should focus on tangible outcomes (Dryzek 2000). In fact, burnout is high among volunteers in participatory efforts if they feel no sense of accomplishment (Byron and Curtis 2002). Many worthwhile outcomes would improve the situation for grizzlies, yet stop well short of devolving authority. These outcomes could include research and monitoring, proactive conflict mitigation, and development of conservation plans that can be readily incorporated into existing wildlife management programs. Undertaking such activities through a participatory process has 2 key benefits. First, these activities make substantive contributions to resolving bear–human conflicts and

←

Fig. 1. A framework for re-connecting grizzly bear populations requires the integration of ecological, social, cultural, technical, and political factors coupled with citizen participation to build support for this complex process.

lower the tension surrounding grizzly conservation. Second, the participatory dimension should foster partnerships among interests who may not be traditional allies. By designing and implementing tangible activities together, interests can develop mutual understanding and perhaps learn to trust one another. Furthermore, as our case studies below illustrate, exhaustive dialogue does not necessarily have to precede practical, hands-on problem solving. These case studies do not exactly match the criteria we outline, but they are real-world approximations of the process we recommend.

Montana's Rocky Mountain Front

This region lies along the eastern edge of the Northern Continental Divide Ecosystem (NCDE), where prairie grasslands meet the Rocky Mountains. The area is ranching country and excellent grizzly bear habitat. The Rocky Mountain Front has experienced an increase in grizzly bear numbers and use of private lands in recent decades (Aune and Kasworm 1989). Thus, this region provides a long-term example of people and institutions learning to live with recolonizing grizzlies. The Montana Department of Fish, Wildlife and Parks (MFWP) has a successful history of working proactively with ranchers, beekeepers, and residents to prevent human–bear conflicts in this area. MFWP's innovative programs ameliorate bear–human conflicts through techniques that include (1) moving carcasses from ranches where they could attract bears, (2) electrically fencing apiaries, calving areas, and sheep bedding grounds, and (3) outreach and education programs with residents (Madel 1996).

One participatory process (initiated by Seth Wilson) built on these efforts and solicited input and help from local conservation groups, MFWP, and residents for a study on factors that lead to human–grizzly bear conflicts. The Teton River Watershed Group (TRWG), a grassroots effort focused on improving water quality and quantity on the Teton River, was sought for assistance in contacting private ranchers. Several ranchers in the TRWG were instrumental in developing relationships with other landowners. Wilson attended many TRWG monthly meetings during 1998–2002 and earned the trust of the group. Wilson assisted with water quality sampling, monitoring work, biological control of invasive plants, and grant writing.

Wilson's research was assisted by MFWP through data sharing and extensive contact with the local bear management specialist, Mike Madel. Madel was instrumental in helping Wilson understand the ecological and social context of the study area, make key landowner contacts, and develop trust with residents. Through participatory GIS mapping, Wilson collected highly personal and detailed information from ranchers and the resident honey producer on livestock and beekeeping management, with a 95% response rate. One result of the mapping was fencing projects for beehives and calving areas paid for by Defenders of Wildlife and MFWP. In summary, participatory efforts by MFWP and Wilson actively engaged local landowners in productive and tangible projects that reduced conflicts with grizzlies along the Rocky Mountain Front.

Blackfoot Valley, Montana

In the southern end of the NDCE, an emerging effort among diverse participants in the Blackfoot Valley shows promise as a participatory approach. The Blackfoot Valley had dramatically increased grizzly activity since the mid-1990s (Great Falls Tribune 1998). In 2002, a grizzly bear apparently traversed this valley to move south as far as the Bitterroot Valley, suggesting that the Blackfoot may be important linkage habitat (J.J. Jonkel, Montana Department of Fish, Wildlife and Parks, Missoula, Montana, USA, personal communication, 2003). Riparian corridors in the Blackfoot likely also function as linkage habitats to areas like the Garnet Range and Rock Creek drainages (Jonkel 2002). As bear activity has increased, so have human–grizzly bear conflicts, including a human fatality in 2001. This incident and the general increase of grizzlies in the Blackfoot generated serious concerns among residents. By the summer of 2002, a series of meetings and discussions were organized by the Blackfoot Challenge (a community-based conservation group), private residents, ranchers, U.S. Fish and Wildlife Service's Partners for Wildlife Program, MFWP, The University of Montana's College of Forestry and Conservation, Brown Bear Resources, Great Bear Foundation, Defenders of Wildlife, and refuse collector Browning Ferris Industries (BFI). Regular meetings ensued, and by 2003, the Blackfoot Challenge created a wildlife committee tasked to improve human–wildlife management in the Blackfoot Valley. This committee worked on human–grizzly bear conflict abatement through a series of sanitation projects, public outreach and education, workshops for ranchers, and GIS-based mapping research. The Wildlife Committee meets quarterly and in 2003 formed a Landowner Advisory Group of key opinion leaders (local ranchers and businesspersons).

This emerging effort uses a placed-based approach that capitalized on the organizational capacity of the Blackfoot Challenge. This provided a forum for civil

dialogue, clear communication, and coherent problem identification. As a result, citizens are taking steps toward practical improvements that complement and enhance existing programs of MFWP. As the Wildlife Committee continues its work, ongoing program evaluation and monitoring of efforts will help gauge the success of this participatory effort.

Gravelly Range, Montana

The Gravelly Range lies west and north of the Yellowstone Grizzly Bear Recovery Zone. It was historic grizzly range, but was apparently devoid of bears for much of the 20th century. Since the mid 1990s, grizzly bear use of the area has increased as an expanding Yellowstone population has begun to recolonize the Gravellies. Through telemetry and other evidence, Schwartz et al. (2002) documented grizzly use of this range since 1990. The Gravellies have tremendous conservation significance, as they are the first step of linkage habitat that could reconnect Yellowstone with other grizzly populations (Picton 1986).

Locally driven efforts are taking a proactive approach to grizzly recolonization in the Gravellies. Since 2000, local people have cooperated with the U.S. Forest Service to improve food storage practices in the backcountry. These efforts have resulted in the construction of 20 food storage structures at backcountry camps. There are ongoing efforts to manage attractants at residences near linkage habitats as well. In 2003, local conservationists received funding from the National Wildlife Federation to purchase bear-resistant garbage containers for key private land linkages between the Gravellies and the Recovery Zone. An informal working group is prioritizing important sites for these containers, including resorts, restaurants, and residences.

In addition, the Gravellies are the focus of cooperative efforts among various interests and MFWP to develop a locally designed grizzly conservation plan (MFWP 2002). We anticipate that this planning process will work in a synergistic fashion with ongoing projects like improved food storage and sanitation. These projects should help demonstrate progress, increase trust and familiarity among participants, and highlight the need to take action. Mutual trust and a sense of accomplishment should make formal, participatory planning more efficient. In turn, formal planning should serve as a force multiplier for the tangible field efforts. Planning helps set priorities, institutionalize conservation, and provide a long-term forum for integrating diverse objectives and addressing grievances.

Cabinet–Yaak Ecosystem, Montana and Idaho

Northwest Montana and the Idaho panhandle harbor a small, isolated population of grizzly bears. Researchers studying the population during the 1980s concluded that the risks of extinction were high (Kasworm and Manley 1988). Subsequently, the Cabinet–Yaak Ecosystem was targeted for intense management efforts to restore a viable population of grizzlies through population augmentation (USFWS 1987). The proposed augmentation initially considered transplanting 8 sub-adult females to the Cabinet Mountains or cross-fostering grizzly bear cubs from zoos using maternal, wild black bears (*Ursus americanus*; Servheen et al. 1995). Public meetings that outlined the proposed augmentation plan generated serious concerns among communities and initial reactions were largely unsupportive (W.J. Kasworm, U.S. Fish and Wildlife Service, Libby, Montana, USA, personal communication, 2003).

In response, community members, the Cabinet Resource Group (a local conservation organization), and the USFWS agreed to jointly create a forum to address the concerns of the community. The USFWS contacted several groups representing conservation, resource extraction, and recreational and local political interests to nominate representatives to this forum, the Cabinet–Yaak Citizen Involvement Committee (CYCIC). By the late 1980s, the CYCIC was meeting regularly to discuss the augmentation plan. After extensive discussions among the committee, the USFWS decided to reduce the number of translocated sub-adult females from 8 to 4, released over 5 years. The USFWS also dropped their proposal to cross-foster grizzly bear cubs with black bears and delayed augmentation for a year. The CYCIC used the year delay to produce a question and answer brochure responding to community concerns. The USFWS, U.S. Forest Service, and MFWP sent the brochure to approximately 14,000 mailbox holders in Lincoln and Sanders counties (Servheen et al. 1995). During the augmentation program from 1990–94, Wayne Kasworm of the USFWS regularly updated the CYCIC on the status of translocated grizzly bears, invited speakers from the region to discuss grizzly bear and endangered species management, and provided updates on the augmentation program through local media. By the mid-to-late 1990s, the CYCIC met less frequently. After augmentation was completed, the USFWS updated CYCIC members through a bi-monthly newsletter.

The efforts of the CYCIC illustrate several components of the participatory framework. First, the proposed augmentation focused on a small enough area to permit identification and incorporation of the human

communities. Second, the membership of the CYCIC broadly reflected the social, cultural, and economic context or interests of the communities in northwest Montana. Third and most important, the CYCIC provided a means for having dialogue, identifying problems, and producing tangible outcomes. A long-time member of the committee told us that, "People did not feel ignored and it got many people who disagreed with one another to talk." (B. Martin, Cabinet Resources Group, Troy, Montana, USA, personal communication, 2003). The USFWS reduced the original number of bears from 8 to 4 for augmentation, did not cross-foster bears, and produced an information brochure with the CYCIC, suggesting that the CYCIC participated in decision-making within the USFWS augmentation program. This outcome may alarm some observers, because it may appear that conservation goals were subordinated to social considerations (Kellert et al. 2000). It may be, however, that no augmentation efforts would have occurred if concerned citizens had not had the opportunity to integrate their goals with conservation objectives.

Given that the Cabinet–Yaak grizzly bear population is small, isolated, and vulnerable to extinction, reorganizing the CYCIC to focus on connecting these bears to other grizzly populations may be productive. The CYCIC could tackle many tangible problems in promoting connectivity. For example, human-caused mortality and unsecured garbage facilities pose major obstacles to population growth and may impede immigration of bears from other ecosystems (W. Kasworm, personal communication, 2003). The CYCIC may be ideally suited to organize efforts to prevent bears from getting garbage, thus reducing mortalities.

These 4 cases and other efforts have great potential to improve grizzly conservation in the Rockies. They are oriented toward practical, tangible problem solving, yet include participatory elements that can help address the underlying value and cultural conflicts of grizzly conservation.

Conclusion

Participatory processes to guide conservation of linkage habitat have great promise. As these efforts unfold, small-scale participatory projects may serve as models for other grizzly conservation efforts. They may also serve as models for improved decision making in affairs that have little to do with grizzly bears. Some may dismiss the direction we propose, and the cases that illustrate it, as piecemeal efforts that are insufficiently ambitious. Although broad, sweeping reforms may promise big payoffs, successful examples are rare. For example, the Northern Rockies Ecosystem Protection Act (NREPA) would, if it became law, greatly expand wilderness protection and establish linkage habitats among grizzly populations (U.S. Congress 2003). Yet, this bold legislation has made little progress, in spite of being introduced in successive Congresses since 1993 (Wilson 1996).

Large-scale initiatives may have an important role to play, despite lack of recent successes. It is possible that these efforts would complement small-scale, participatory activities for grizzly conservation. Moreover, we are not asserting that everyone needs to abandon their current activities and involve themselves in small-scale, participatory grizzly conservation projects. We believe, however, that small-scale projects have tremendous potential.

One caution is that small-scale efforts may be uncoordinated and inconsistent. If not executed carefully, small-scale participatory efforts may not contribute to broader bioregional objectives. They may also fail to serve as models that reduce tension associated with grizzly conservation. So it is important that practitioners have clear objectives and communicate with one another to coordinate and share lessons.

The process criteria we outlined should help considerably in ensuring high quality projects. Dialogue separate from authoritative decision-making is a key element, because it directly addresses the value conflicts that underlie disputes over conservation. We reiterate, however, that action and dialogue should be interwoven, so citizens can make headway in solving practical problems associated with grizzly conservation. The case studies we outlined are good examples of this kind of problem solving, pursued in a participatory manner. In addition, by working sequentially from occupied grizzly habitat, practitioners will contribute effectively to reconnecting grizzly populations. In the end, we may see a rare case: the cumulative effects of our activities leading to major gains for grizzly bears, instead of losses.

Acknowledgments

We gratefully acknowledge the dedication and energy of all our partners in participatory conservation efforts on the Rocky Mountain Front, Blackfoot Valley, Gravelly Range, and Cabinet–Yaak ecosystem. Without their hard work, commitment to community, and conservation ethics, our work would be impossible. We have learned a great deal from these people, and from those involved in participatory processes elsewhere. Reviews by

S. Miller, H. Fischer, V. Backus, and an anonymous reviewer greatly improved the paper. W. Kasworm, J. Shively, and B. Martin provided thorough accounts of the Cabinet–Yaak process. We thank Montana Fish, Wildlife and Parks for their insights and knowledge regarding participatory processes. S. Primm was supported by grants from World Wildlife Fund-US, Wilburforce Foundation, Arthur B. Schultz Foundation, and the Norcross Foundation. Work on this manuscript by S. Wilson was supported in part by grants from the Wilburforce Foundation, National Fish and Wildlife Foundation, and Pumpkin Hill Foundation.

Literature cited

AUNE, K., AND W. KASWORM. 1989. Final report, East Front grizzly bear studies. Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA.

BADER, M., AND T. BECHTOLD. 1996. A Northern Rockies reserve system for grizzly bears and other wildlife. Montana Academy of Sciences, Missoula, Montana, USA.

BERKES, F., AND C. FOLKE, editors. 1998. Linking social and ecological systems: Management practices and social mechanisms for building resilience. Cambridge University Press, Cambridge, UK.

BORRINI-FEYERABEND, G. 1997. Beyond fences: seeking social sustainability in conservation. International Union for the Conservation of Nature, Gland, Switzerland. http://www.iucn.org/themes/spg/Files/beyond_fences/beyond_fences.html (Accessed 23 December 2003).

BURNS, C. 1997. Grizzly reintroduction advocate upsets Salmon crowd. Idaho Falls Post-Register 9 October 1997:B1.

BYRON, I., AND A. CURTIS. 2002. Maintaining volunteer commitment to local watershed initiatives. Environmental Management 30:59–67.

CARROLL, C., R.F. NOSS, AND P.C. PAQUET. 2001. Carnivores as focal species for conservation planning in the Rocky Mountain region. Ecological Applications 11:961–980.

CAUGHLEY, G. 1994. Directions in conservation biology. Journal of Animal Ecology 63:215–244.

CESTERO, B. 1999. Beyond the hundredth meeting: a field guide to collaborative conservation on the West's public lands. Sonoran Institute, Bozeman, Montana, USA.

CLARK, T.W. 2002. The policy process: a practical guide for natural resource professionals. Yale University Press, New Haven, Connecticut, USA.

COHEN, J. 1998. Democracy and liberty. Pages 185–231 *in* J. Elster, editor. Deliberative democracy. Cambridge University Press, New York, New York, USA.

CRAIGHEAD, J.J., J.S. SUMNER, AND J.A. MITCHELL. 1995. The grizzly bears of Yellowstone: their ecology in the Yellowstone ecosystem, 1959–1992. Island Press, Washington, D.C., USA.

DAHL, R.A. 1994. The new American political (dis)order. Institute of Governmental Studies Press, Berkeley, California, USA.

DRYZEK, J.S. 2000. Deliberative democracy and beyond: liberals, critics, contestations. Oxford University Press, New York, New York, USA.

FINLEY, T. 2001. The great American land grab. Range Magazine Winter 2001:1M–8M.

FISHKIN, J.S., AND P. LASLETT. 2003. Debating deliberative democracy. Blackwell Publishing, Malden, Massachusetts, USA.

FORMAN, R.T.T. 1995. Land mosaics: The ecology of landscapes and regions. Cambridge University Press, New York, New York, USA.

GREAT FALLS TRIBUNE. 1998. Blackfoot Valley needs a grizzly management plan. Editorial. 4 August 1998:4A.

INGALLS, D. 2001. Great news! Ingalls and Sons Angus, Riverton, Wyoming, USA, http://www.wyoag.com/Ingalls/Idaho.htm (Accessed 23 December 2003).

JONKEL, J.J. 2002. Living with black bears, grizzly bears, and lions project update. A report by Montana Department of Fish, Wildlife and Parks. Missoula, Montana, USA.

JORDAN, T.G. 1993. North American cattle-ranching frontiers: Origins, diffusion, and differentiation. University of New Mexico Press, Albuquerque, New Mexico, USA.

KAGAN, R.A. 1997. Political and legal obstacles to collaborative ecosystem planning. Ecology Law Quarterly 24:871–875.

KASWORM, W., AND T. MANLY. 1988. Grizzly bear and black bear ecology in the Cabinet Mountains of northwest Montana. Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA.

KELLERT, S.R., J.N. MEHTA, S.A. EBBIN, AND L.L. LICHTENFELD. 2000. Community natural resource management: promise, rhetoric, and reality. Society and Natural Resources 13:705–715.

LACY, R.C. 1997. Importance of genetic variation to the viability of mammalian populations. Journal of Mammalogy 78:320–335.

LANDE, R. 1993. Risks of population extinction from demographic and environmental stochasticity and random catastrophes. The American Naturalist 142:911–927.

LIDICKER, W.Z. JR. 1999. Responses of mammals to habitat edges: an overview. Landscape Ecology 14:333–343.

MADEL, M.J. 1996. Rocky mountain front grizzly bear management program: four year progress report. Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA.

MATTSON, D.J., S. HERRERO, R.G. WRIGHT, AND C.M. PEASE. 1996. Science and management of Rocky Mountain grizzly bears. Conservation Biology 10:1013–1025.

MCLELLAN, B.N., AND F.W. HOVEY. 2001. Natal dispersal of grizzly bears. Canadian Journal of Zoology 79:838–844.

MEYER, S.M. 2001. Community politics and endangered species protection. Pages 138–165 *in* J.F. Shogren and J. Tschirhart, editors. Protecting endangered species in the

United States: biological needs, political realities, economic choices. Cambridge University Press, New York, New York, USA.

MILLER, C.R., AND L.P. WAITS. 2003. The history of effective population size and genetic diversity in the Yellowstone grizzly (*Ursus arctos*): implications for conservation. Proceedings of the National Academy of Science 100:4334–4339.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS. 2002. Grizzly bear management plan for southwestern Montana, 2002–2012. Montana Department of Fish, Wildlife and Parks, Bozeman, Montana, USA.

NEW YORK TIMES. 2002. Grizzlies at risk. Editorial. New York Times:19 May 2002. www.nytimes.com/2002/05/19/opinion/19SUN3.html (Accessed 19 May 2002).

NOSS, R.F., H.B. QUIGLEY, M.G. HORNOCKER, T. MERRILL, AND P.C. PAQUET. 1996. Conservation biology and carnivore conservation in the Rocky Mountains. Conservation Biology 10:949–963.

OLIVERIA, D.F. 2000. Grizzlies make lethal neighbors. Spokane Spokesman-Review:24 March 2000. http://www.spokane.net/news-story&ID=s758498&cat=section (Accessed 24 March 2000).

PELLETIER, K.J., AND C. SERVHEEN. 1995. Grizzlies in the Swan Valley. Endangered Species Bulletin XX(5):22–23.

PICTON, H.D. 1986. A possible link between Yellowstone and Glacier grizzly bear populations. International Conference on Bear Research and Management 6:7–10.

PIMM, S.L., H.L. JONES, AND J. DIAMOND. 1988. On the risk of extinction. American Naturalist 132:757–785.

PRIMM, S.A. 1996. A pragmatic approach to grizzly bear conservation. Conservation Biology 10:1026–1035.

RUEDIGER, B., J.J. CLAAR, AND J.F. GORE. 1999. Restoration of carnivore habitat connectivity in the Northern Rocky Mountains. Pages 185–231 *in* G.L. Evink, P. Garrett, D. Zeigler, editors. Proceedings of the Third International Conference on Wildlife Ecology and Transportation. FL-ER-73-99. Florida Department of Transportation, Tallahassee, Florida, USA.

SCHWARTZ, C.C., M.A. HAROLDSON, K.A. GUNTHER, AND D. MOODY. 2002. Distribution of grizzly bears in the Greater Yellowstone Ecosystem, 1990–2000. Ursus 13:203–212.

SERVHEEN, C., W.F. KASWORM, AND T.J. THIER. 1995. Transplanting grizzly bears *Ursus arctos horribilis* as a management tool—results from the Cabinet, Mountains, Montana, USA. Biological Conservation 71:261–268.

———, J.S. WALLER, AND P. SANDSTROM. 2003. Identification and management of linkage zones for wildlife between the large blocks of public land in the northern Rocky Mountains. U.S. Fish and Wildlife Service, Missoula, Montana, USA, http://endangered.fws.gov/pubs/Linkages_Report_2003.pdf (Accessed 24 February 2004).

U.S. CONGRESS. 2003. H.R. 1105, Northern Rockies Ecosystem Protection Act, 108th Congress. http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:h1105ih.txt.pdf (Accessed 23 December 2003).

U.S. FISH AND WILDLIFE SERVICE. 1987. Draft environmental assessment—grizzly bear population augmentation test, Cabinet–Yaak Ecosystem. U.S. Department of Interior, Denver, Colorado, USA.

———. 1993. Grizzly bear recovery plan. U.S. Fish and Wildlife Service, Missoula, Montana, USA.

URBIGKIT, C. 2002. The coup counties: western Wyoming commissioners outlaw grizzlies and wolves. Range Magazine Fall 2002:ESA30–ESA31.

WEICK, K.E. 1984. Small wins: redefining the scale of social problems. American Psychologist 39:40–49.

WILSHUSEN, P.R. 2000. Local participation in conservation and development projects: ends, means, and power dynamics. Pages 288–326 *in* T.W. Clark, A.R. Willard, and C.M. Cromely, editors. Foundations of Natural Resources Policy and Management. Yale University Press, New Haven, Connecticut, USA.

WILSON, S.M. 1996. The social and political viability of biological corridors on private lands: A case study in Lewis and Clark County, Montana. Thesis, University of Montana, Missoula, Montana, USA.

WONDOLLECK, J.M., AND S.L. YAFFEE. 2000. Making collaboration work: lessons from innovation in natural resource management. Island Press, Covelo, California, USA.

YANKELOVICH, D. 1999. The magic of dialogue: transforming conflict into cooperation. Simon and Schuster, New York, New York, USA.

Received: 3 March 2003
Accepted: 7 November 2003
Editor: S.D. Miller