

Chapter 6

Large Scale Conservation in the Greater Yellowstone Ecosystem: A Field Assessment and Recommendations

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ABSTRACT

As graduate researchers in a seminar on large scale conservation, we visited the Greater Yellowstone Ecosystem, which is a large scale landscape, to investigate natural resource management challenges. A rapid assessment provided insight into the issues, participants, perspectives, and values in the social process underway there. We identified obstacles to the achievement of common interest outcomes through interviews, discussions, first-hand observations, and literature reviews rooted in the policy sciences analytic approach. Our observations revealed an inadequate participatory-based decision process that fails to satisfy valid and appropriate interests of diverse participants. We identified positive steps that are being taken in the region, including better management practices for historically marginalized stakeholders and describe examples. We recommend further use of these strategies, with an overall move toward an adaptive governance model of management, in the common interests.

Key words: *Large-scale conservation, Greater Yellowstone Ecosystem, Yellowstone, adaptive governance, scientific management, innovation, prototyping*

INTRODUCTION

For 140 years Yellowstone National Park has served as a powerful symbol of the importance of protecting nature for the benefit of present and future generations. Today, the park and surrounding region are home to abundant wildlife, alpine flora,

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and unique geological features. Some people see the park as a symbol of the greatest idea America ever had, while others see it as a symbol of federal presence in the Greater Yellowstone Ecosystem (GYE), and government intrusion in the lives of locals. Through its role as a symbolic and political landscape, the park and the large scale GYE have become a confluence of wide-ranging and conflicting values, perspectives, and strategies for management and policy. Stakeholders on all sides of the many issues are generally well informed and immensely passionate, and they display an intelligent and caring regard for their interests. In this context, persistent policy problems impede achievement of a common interest-oriented approach to wildlife and resource management (see Vogel 2006).

This paper describes a ten-day field trip in March 2009 taken by nine students enrolled in Professor Susan G. Clark's large scale conservation seminar at the Yale School of Forestry & Environmental Studies. The field trip was a rapid appraisal in the northern GYE from Cooke City to West Yellowstone and Old Faithful to Madison Valley, Montana. We describe the trip and our interactions briefly, analyze them, and offer our perspective and recommendations. We surveyed selected persistent policy problems (e.g., wolf and grizzly bear management). We sought innovative programs to address this kind of problem. We sought examples of efforts that are working on the ground already. These innovative efforts are advancing shared interests common to citizens and officials. As such, they can serve as exemplars for resolving the widespread conflict in the GYE and in other large scale ecosystems.

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STUDY AREA, METHODS, AND STANDPOINT

In this section we describe the large scale ecosystem that we visited, our observational methods and theoretical foundation, and our standpoint as observers and researchers.

Study area

The GYE is an example of a very high profile large scale ecosystem. The GYE has been described by diverse authors (e.g., Clark and Minta 1994, Schullerly 1997, Ferguson 2003). GYE is a unique biological and geological system. It is irregularly shaped and about 500 km north-south and 250 km wide. It is about 77,000 km² or 7,600,000 ha. The Continental Divide bisects it. The Yellowstone Plateau occupies much of Yellowstone National Park at the heart of the greater ecosystem. The region has over 200 geysers and over 10,000 thermal features altogether. The GYE is headwaters to the Yellowstone-Missouri, Green-Colorado, and Snake-Columbia river systems, and contains about 300 bird and 70 mammal species. Overall, the flora and fauna are

relatively intact, but invasive species and beetle kills are changing the biota of the region.

The region has been colonized by Euro-Americans in the last 130 years. A former wilderness of the 1850's has been transformed today into a destination for millions of visitors each year. Much of the greater ecosystem is under federal government ownership as parks, forests, sagebush basins, and wildlife refuges. Challenges facing this large scale ecosystem were summarized by Clark (2008) who surveyed literature from researchers, government agencies, nongovernmental organizations, popular writers, and others. To be sure, there are many concerns about the conservation of natural resources, especially rare species, but at heart are problems with how people interact with one another, how decisions are made, and with leadership (see Clark 2008). We visited parts of the northern GYE encompassing the Lamar Valley in the northeastern section of the park and saw firsthand some of the challenges.

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Methods

We chose to go to GYE because it is important globally and often touted as a model large scale conservation system. The team sought to gain insight into the management challenges facing the region through firsthand observations and conversations with relevant officials, experts, and other participants. We used the rapid assessment method, which is increasingly popular and can be implemented with limited resources to great effect (Clark and Ashton 2004). Rapid assessments are generally performed within a short period, from a few days to a few weeks, with the aim of identifying specific problems, determining why these problems exist, and proposing what might be done about them (Grandstaff et al. 1985, Del Campo and Clark 2009). Many rapid assessments focus only on technical and ecological aspects of a problem, whereas others focus more on human components, but often lack adequate problem orientation and a thorough contextual focus (Clark et al. 2000). Rapid assessments that lack contextual approach preclude an integrative or interdisciplinary perspective on the problems, as well as the possibility of formulating practical, justified, and reasonable solutions (Clark et al. 2001). In contrast, we sought to be explicitly and systematically problem-oriented, contextual, and interdisciplinary.

Our team had only a few days for on-site assessment in the geographically vast, ecologically complex, and intricately contested ecosystem. We employed rapid appraisal to gain a broad overview and understanding of issues as circumstances permitted. We took copious notes, many anecdotal. Our rapid assessment consisted primarily of discussions with selected participants in the GYE's key management challenges. We met formally with ten professionals actively working in the GYE and

had informal discussions with tourists, recreationists, local community members, conservation advocates, scientists, and park employees. We spoke with officials and leaders in government and outside government. We also spoke informally with snowmobilers, local business owners, tourist guides, service workers, and local citizens, totaling more than fifty people. From these sources, we were able to parse out distinct and recurring themes and patterns in people's standpoints, management paradigms, problems, conflicts, and possible solutions. Throughout this document, attributions are anonymous out of respect for the participants interviewed.

We followed up with more intense discussions amongst ourselves and literature reviews (see Robbins 2006 for example) over nine months after the field trip. The data from the trip, largely based on participant observation, open-ended interviews, and lectures/presentations, were analyzed using the concepts and framework of the policy sciences, literature, and guest speakers in the seminar knowledgeable with the region (e.g., David Mattson, Mike Gibeau, Murray Rutherford), and from our collective life experiences in other diverse contexts (Lasswell 1971).

Interdisciplinary problem solving relies on mapping problems contextually, that is, examining management and policy issues, including activities (i.e., the decision process) that make them up. We thus mapped the interactive activities or components of the decision process we observed—intelligence (planning), promotion (debating, recommending), prescription (deciding), invocation (initial implementation), application (final implementation), termination (ending or succeeding), and appraisal (evaluation). The content of these activities differed across different substantive issues (e.g., fire management, wolf reintroduction, or grizzly bear recovery). Interdisciplinary problem solving also includes examining organizational cultures and structures, leadership, and many other factors in evidence-based ways.

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We analyzed data from our interviews, conversations, and observations of actual social process and differing perspectives on problems. First, all resource management problems occur within a context, characterized here as the interaction of every individual and organized interest in the arena or social process. Data were obtained on participants and organizations, their perspectives, values, strategies for attaining values, and outcomes.

Next, problem orientation mapping is about procedural rationality and serves as a guide to identifying problems that impede sustainable management. It calls for describing circumstances and problems empirically and exploring remedies to identified problems. We used five critical thinking elements to orient to the problem: (1) clarifying goals and finding measurable indices of them; (2) mapping trends

(historical data on these indices that affect the problem); (3) determining the conditions behind or underlying the trends; (4) projecting likely future conditions if nothing is done and then explicating any problems that arise from our trend and condition analysis. We sought (5) to invent, evaluate, and select possible solutions. In short, we sought through our rapid assessment to find alternatives to “business as usual,” so as to improve decision processes currently at play in the GYE in ways that serve the common interest. Finally, we drew on three tests of the common interest to assess the efficacy of present management and policy in the GYE. Our approach included the procedural, substantive, and pragmatic tests (see Steelman and DuMond 2009, Brunner 2002, 2005, Clark 2002). The main aim of our trip was finding innovations that are addressing underlying people and decision making problems. We focus on those in our recommendations section.

Standpoint

Our standpoint during the field trip and in this report was an amalgamation of the perspectives and backgrounds of nine observers. Because our standpoint, collectively and individually, influenced our analysis and recommendations, it is appropriate to discuss it here.

The nine team members possess broad experience in conservation and resource management across diverse contexts from local to international. Our backgrounds include work in conservation advocacy groups, government and private wildlife research, international conservation NGOs, government and contract positions, and extensive technical field research. Most team members are published authors. This grounding in real-world experience enabled the team to gather and analyze data as experienced practitioners with a collective understanding of the realities of complex and sensitive management problems.

The team embarked on the survey of the GYE with a shared regard for clarifying and promoting participants’ common interests and a keen interest in conserving the natural environment. We were aware of the range of widely accepted approaches to large-scale conservation, including parks and protected areas, single and multiple use management, ecosystem management, integrated conservation and development, ecoregional planning, transboundary management, and adaptive governance (see Chapter 3, this volume) before the trip. We used the trip to improve our skills as observers, researchers, and analysts (see Chapter 9). We sought to advance our skills in assessing management and policy in a complex, large-scale ecological system. Our recommendations are intended to aid all participants, including policy makers in the GYE and elsewhere, as well as future students of conservation policy and natural resources management.

ASSESSMENT

All problems have a social and a decisional context. Mapping and understanding these is essential to clarifying problems and searching for solutions. This section briefly examines these two contextual elements.

Social process mapping

Broadly speaking, in their daily interactions people seek to maximize human values for themselves—power, wealth, respect, affection, rectitude, skill, enlightenment, and well being (Lasswell 1971). In any social process, individual and organizational participants have value assets and liabilities they seek and use in every interaction (Clark 2002). Diverse problems throughout the GYE can be defined not only in biophysical terms or conditions, but also in terms of actual value deprivations and indulgences, that is, whether the participants get more of what they want or less (Clark and Wallace 2002). Within the GYE, the value position or standing of some participants has eroded through social process. For example, locals feel that respect for their views has declined over the years. Environmentalists feel they are being slighted. And many people, wanting to influence decision making, feel their power has diminished. This has led to a drawdown of trust and cooperation among participants that may have existed historically (Table 1). In turn, this constrains the ability of social and decision processes to identify enduring solutions to problems. Understanding how values deprivations can be reversed through improved social and decision process is critical to clarifying and securing the common interest (see Kahn 2000, Cromley 2000).

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Table 1 A selected overview of the complex social process in the Greater Yellowstone Ecosystem

Participant	Perspectives	Values	Outcomes of past social process
Wildlife conservation groups	Wolves, grizzlies, and other species deserve protected status to enable their numbers to grow beyond park boundaries	Rectitude, power, respect	Lack of respect, some degree of power through litigation, feeling of inadequate rectitude
Ranchers	Wildlife conflicts with ranchers' ability to earn a living and therefore should be kept within park boundaries	Respect, wealth, well-being	Lack of respect, damage to wealth and well-being through continued conflict with wildlife
Government and park managers	Much variation; commonalities include the bureaucratic tendency to embrace the status quo	Power, skill, respect, enlightenment, rectitude	Lack of respect, some enlightenment via scientific research, significant power

In short, participants in the GYE currently lack an effective arena through which they can explore their different perspectives, and relative value indulgences and deprivations, in a realistic problem-oriented, and contextual way. Consequently, special interests clash ceaselessly in the media, politically, and in the courtroom. This lack of an arena only inflames and recycles conflict, escalates the symbol politics of matters at hand, and further precludes working toward common interest outcomes and effects. It is clear that the value demands of diverse stakeholders are being stymied in many ways, with the value of respect being denied or drawn down for most participants. Although some officials and environmentalists do realize the need for a common platform to discuss and identify common interests, they have lacked the authority, applied tools, and the arena that would enable them to move forward.

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A superficial understanding of differences in demands among stakeholders masks value similarities (e.g., demands for respect). For example, conflict is most visible between the ranching/agricultural community and the federal government (Taylor and Clark 2005). The ranching community feels deprived of power (over their grazing lands and lack of means to voice their views on problems and solutions) and wealth (because of real and perceived restrictions on their management relative to large carnivores such as wolves and bears). This leaves ranchers, like many other participants, feeling disrespected, slighted, and powerless. This is compounded by an increasing number of residents in the GYE who lack a ranching background, combined with increasing tourism and its growing importance to the region's economy, which symbolically threatens the ranchers even more. Additionally, the environmental community feels that its voice remains largely unheard as well, unless they can reach officials via litigation. Weekly newspapers are full of examples across diverse issues (e.g., endangered species, oil and gas development, tourism issues). This widespread feeling of loss of respect and dignity across most sectors complicates social and decision processes and further alienates individual participants and groups.

Additionally, the social process in the GYE has been ineffective at addressing some of the major policy problems because some major stakeholders have been historically excluded from the process. Combined with other historic trends and conditions, conflict with large carnivores, in particular, has become highly symbolic of deeper value dynamics, perspectives, and practices (Clark et al. 2005, Clark 2008). With the spread of wolves and grizzlies throughout the GYE in the few last decades, for example, wildlife-livestock conflict has become one issue that local community members feel they need to address. Some locals fear that change, including accommodation of large carnivores, would lead to sacrificing their way of life, a belief

that has led to conflict over the values of respect, rectitude, power, and wealth. Their views differ from newer residents of the region, who view large carnivores as part of the landscape and are more willing to participate in coexistence initiatives.

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Finally, debates over listing and delisting of grizzlies and wolves from Endangered Species Act protection are heavily laden with symbol inflation. This process of large carnivore management has little to do with the animals and their ecology and a lot to do with the threat that legislation, government, and bureaucracy imply or mean in terms of people's shifting value holdings and demands. Strategies employed by many participants so far have been more ideological and coercive—through newspaper articles, letters to the editor, and organizing activist campaigns—than ameliorative and persuasive. These further divide participants and preclude productive discourse. Some attempts have been made to initiate multi-group interaction, but more organized, large-scale, and authoritative efforts are necessary to make a difference (e.g., Primm and Clark 1996, Mattson et al. 2006).

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Many participants, including decision makers in the GYE, rely almost entirely on scientific management in formulating management policy and actions, positioning themselves politically, and measuring success of their endeavors. Others seem to be transitioning toward an alternative approach—adaptive governance—and, in some instances actively embracing it explicitly (see Chapters 1, 2, 3, this volume, and examples below).

Decision process mapping

In this section we examine dominant patterns in the overall decision process in the region, as we saw them and as described in the literature (e.g., Clark 2008). Our descriptions focus on the interconnected activities and functions of any decision process: (1) intelligence (planning), (2) promotion (debating, recommending), (3) prescription (deciding), (4) invocation (initial implementation), (5) application (final implementation), (6) termination (ending or succeeding), and (7) appraisal (evaluation). We draw on widely recognized standards for each function as listed in Table 2 and described by Lasswell (1971, Brunner et al. 2005). Other researchers have

arrived at conclusions similar to ours, for example, Cromley's (2000, 2002) examinations of grizzly bear and bison management in the GYE.

Table 2 The decision process in two different management paradigms practiced by participants in the Greater Yellowstone Ecosystem

Decision process phase	Standards	Traditional management	Adaptive governance practitioners
Intelligence (planning)	Dependable Comprehensive Selective Creative Available	Intelligence comes only from positivistic science; not comprehensive, creative, or available	Comprehensive, inclusive, multi-method approach; intelligence may come from community
Promotion (open debate)	Rational Integrative Comprehensive Effective	Goals are viewed as single-target; overly selective (not comprehensive) and fails to integrate multiple valid perspectives	Multi-method, comprehensive function; fosters active debate and open dialogue
Prescription (selection)	Effective Rational Inclusive Forward-looking	Single-authority decision making; not inclusive or forward-looking	Bottom-up selection process ensures inclusivity and effectiveness in terms of expectations
Invocation (enforcement)	Timely Dependable Rational Non-provocative Effective	Central authority enforces prescription; often extremely provocative as participants protest	All participants fully involved in enforcement; ensures rational invocation
Application (Implementation)	Rational Contextual Unbiased Constructive	Only experts are qualified to implement policy; fails to be unbiased; litigation is commonly used	All participants establish a method of mediation to ensure continued community support, is contextual
Appraisal (evaluation)	Dependable Continuing Independent Contextual	Appraisals typically not fully problem-oriented or contextual; focused on single quantitative goals; fails to account for social and historical context	Policies are appraised in light of the perspectives of all valid participants and of the common interest
Termination (exit)	Comprehensive Timely Dependable Ameliorative	Termination rarely occurs because of the permanent nature of government programs	Prompt termination of ineffective or conclusively successful policies, with comprehensive and ameliorative stakeholder input

Intelligence (planning)

In the GYE, scientific managers typically strive to provide data on wildlife populations and ecosystem features, which are used to assess current events and

create future scenarios. Relationships among important variables tend to be tested or examined in a reductionist manner, regardless of differing contexts. However, these data are often incomplete, poorly communicated to the public, and may not be trusted by all stakeholders. Moreover, data are typically used in a partisan, political fashion to defend the status quo. Consequently, the data do not offer a complete picture of the problems at hand in the GYE or their contexts, thus lacking in comprehensiveness and other standards of a high quality decision process (Table 2). This leads to suboptimal decision process outcomes.

In contrast, a growing minority of practitioners uses an alternative approach—adaptive governance—in their planning activities. They focus on studying evolving relationships among people and wildlife in differing contexts as described below and in Brunner (2005). Adaptive governance requires multiple methods and triangulation of data in intelligence gathering, approaches that extend well beyond those traditionally used by resource managers. Both qualitative and quantitative methods are used and integrated. Through this approach, context-specific information about the conservation issue is collected and made available to everyone who is affected or interested by the issue. Disseminating data and research findings to appropriate stakeholders is emphasized. In this way, practitioners satisfy the high standards of the intelligence function (Table 2), including dependability and comprehensiveness. Intelligence experts and citizens are also creative in their methods of finding and managing the facts. For example, in Jackson Hole, Wyoming, a wildlife conservation group is turning to “citizen science” to collect information about wildlife movements.

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Promotion (open debate)

In the promotion process, participants dedicate themselves to finding solutions to problems as they understand them. Typically, resource managers make policy recommendations that center only on the biological or ecological aspect of the problem at hand. They tend to see goals as single targets, ignoring context in an effort to eliminate uncertainty, and these incomplete problem definitions come to dominate promotion and debate (Brunner 2002).

Often the conclusion is that further scientific research is needed. Restrictions placed on the kind, quality, availability, and use of information produces a promotional process that does not meet recommended standards of a high quality activity (Table 2). This leads to suboptimal decision outcomes.

Ideally, through open dialogue and commitment, communities can develop a policy alternative that is supported by a broad spectrum of participants and likely to be rational, integrative, comprehensive, and effective in the long run.

We did observe some practitioners who were working to promote much more open and active debate about the issues and testing solutions different from those promoted by government officials. Some practitioners do so quietly, working through projects with locals, whereas others do so publicly through the media, community organizing, and political advocacy. Trying to bring together participants in open discussion and to secure common interest outcomes is a feature of adaptive governance (Brunner et al. 2002, 2005). For example, Mattson and colleagues (1999) brought diverse parties together in Bozeman, Montana, in 1999 to find shared interests and common ground in large carnivore conservation. Adaptive governance facilitates more integrative and comprehensive means to address relevant stakeholders' values and considers a wider range of alternatives. In this decision process function, people's values and interests, as well as other contextual considerations, are key. Ideally, through open dialogue and commitment, communities can develop a policy alternative that is supported by a broad spectrum of participants and likely to be rational, integrative, comprehensive, and effective in the long run.

Prescription (selection)

The prescription function is the part of the decision process that creates, selects, and enables rules and norms. Decisions are made and resources are committed. Decision makers have a large role in the prescription function as they determine whether new rules will complement those already established. Scientific managers in the GYE are involved in this part of the process through the creation of management plans, environmental impact statements, and other prescriptive activities, but these efforts usually do not include the full range of stakeholders and are therefore generally not effective at addressing issues of large-scale conservation. Failure to meet the expectations of all participants in decision making or to account for how social factors might influence those outcomes in the future leads to suboptimal outcomes (Table 2). Clearly, attention to people and their perspectives, including their expectations, is key to successful large scale conservation.

People who utilize the adaptive governance framework, in contrast, influence the prescription function by creating an arena for dialogue so that prescriptions will meet people's expectations and not disrupt the community's standards of operation. Community standards include openness, fairness, timeliness, mutual respect, and more. Selection of a policy prescription using the adaptive governance framework integrates policy from both the bottom up and top down (Brunner 2005). Solutions that are based in community initiatives as well as local knowledge confer respect for participants and establish inclusivity.

Invocation (enforcement)

This part of the decision process deals with the initial implementation of the new rules, or putting the new rules into effect, including enforcement (Table 2). For example, in the GYE, rules and regulations are formally promulgated and officials

invoke them through making regulations and citations. Invocators look for violations of the new prescription, and these may be about poaching, off-trail recreation, and other illegal activities. These public order activities are typically visible to the public, especially as they play out in application (e.g., in the courts).

In contrast, adaptive governance seeks to use civic norms as much as possible to establish and invoke new rules, regulations, and policies. Community standards and norms are brought into play as much as possible, thereby reducing the need for official public order invocation. This is community-based conservation work at its best. Bruner et al. (2002, 2005) offer diverse examples of successful community-based conservation in the American West.

Application (implementation)

This function encompasses society's response to a new rule, ideally resolving disputes over how prescriptions will be implemented and under whose authority (Clark 2002). The management system in place in the GYE dictates that these activities emanate from a single source, i.e., the government. Managers view experts as the only individuals who are qualified to implement sound management plans and bureaucracies as necessary agents to enforce plans. Therefore, disputes must be appealed directly to the centralized authority, often through litigation.

Adaptive governance instead places importance in the ability of community participants to voice their concerns about a policy or plan or the way it is to be implemented. This part of the decision process helps to establish a method of mediation so that new policies can be successfully implemented with continued community support. Throughout the implementation of new rules or policies, managers who incorporate adaptive governance create open dialogue between stakeholders—for instance, those involved in grizzly bear and wolf management issues—to allow for successful mediation between individuals or groups who may have doubts about a prescription or policy. The shortcomings of bureaucracies can be balanced by using community-based initiatives to ensure effective, constructive application and to bring people together.

Appraisal (evaluation)

Appraisal is vital for the success of conservation management and policy in seeking open and honest monitoring and evaluation of past actions. Too often, honest, independent appraisal is absent, resulting in policies that do not meet their goals and create rifts between participating groups. Independent appraisals are rare because they take a lot of time and experience to do well. Resources are often not available to support them. In the GYE, we observed little thorough appraisal of past decisions, policies, and actions from sources who are independent. Appraisal should be ongoing and available to anyone.

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Appraisals typically fail to consider fully the context, that is, the interests of local communities, ranchers, hunters, recreationists, and other stakeholder groups, including the management agencies themselves (Clark 1993). This oversight adds to feelings of alienation and marginalization on the part of some participants, engendering hostility toward some policy prescriptions and among individuals and organizations. A clear example of this is the “Aggregation” and “Vision” exercises of the federal government in GYE in the 1980s (see Clark 2008: 123-128). Some stakeholders observe that decisions makers do not have to deal with the consequences and outcomes of their actions in their everyday lives.

In contrast, an adaptive governance approach holds the appraisal function as one of the most important in achieving success. With many previously implemented conservation plans not meeting their goals, appraisal can be difficult to navigate because many policy makers are reluctant to acknowledge their policy “failures.” However, dependable, contextual appraisal is necessary in order to adapt policy so that it better meets its goals. Hobbs (2009: 2) says that “accepting failure and learning from it are an integral part of adaptive management.”

Termination (exit)

The termination function is the cancellation or adjustment of ineffective or unnecessary policies. Policies that have been judged successful in reaching their goals can be ended, and policies determined to be harmful or ineffective can be replaced by new policies that the community has determined will be more likely to meet the common interest. Policies that are terminated because of their success may be diffused and adapted elsewhere (Brunner 2005).

Official decision processes in the GYE have consistently failed to carry out the termination function according to high standards (e.g., the delisting of grizzly bears is one such example). This has led to many problems. Many factors account for the fact that failing policy prescriptions are exceedingly difficult to end, not least of which is the tenacity of those who have benefited from the prescription.

In contrast, adaptive governance calls for active independent, timely, comprehensive, and ongoing appraisal as a basis for learning and determining when and how termination should occur. The examples described in our recommendation section below show how active learning can be used in ongoing, actual programs.

Common interest tests

Unless the common interest is set as the primary goal of management and policy, sustainable solutions to problems will be difficult to achieve. The common interest can be defined as an interest that is widely shared within a community of stakeholders and is demanded on behalf of the whole community (Clark 2002). Whether the common interest has been identified and secured in any natural resource decision-making process can be deduced through the application of three partial tests, applying procedural, substantive, and pragmatic criteria (see Steelman and DuMond 2009). Data from the GYE cases that we learned about show that many decision processes fall short in all three tests of the common interest.

Unless the common interest is set as the primary goal of management and policy, sustainable solutions to problems will be difficult to achieve.

First, the procedural criterion asserts the need for fairness in the decision process by providing the participants with a sense of inclusivity, representation of their interests, balance, opportunities to voice their views, and sound justification for any action taken. Although the traditional management system has aided recovery of species like grizzly bears and wolves, it has made little overall progress toward increasing inclusivity for all participants, especially those historically opposed to agency decisions, except in token, ritualistic ways.

Our appraisal suggested that the existing management framework is weak in maintaining openness, representation, balance, and fairness in granting participation of diverse interests. This precludes opportunities for people to voice their perspectives in meaningful ways in existing, authoritative arenas. For example, we heard from diverse people and interests, including scientists, managers, conservationists, and ranchers, as well as park officials, who recognized that not all groups are being fairly heard at present. The issue is of one of procedural fairness and clearly needs to be rectified.

Second, the substantive criterion tests whether an outcome meets the valid and appropriate expectations of all participants, as supported by data. Again, valid interests are those that are appropriate to the issue at hand (e.g., role of hunters in grizzly bear deaths) and supported by data saying that the issue is important (e.g., too many bears are being killed by hunters). This test determines the validity of the concerns that stakeholders express, inspecting whether claims are made based on broader community goals and evidence (Brunner 2002). It also seeks to determine if people's expectations are valid given the content of the issue, the data, and the process at hand.

Our assessment revealed no data that showed attempts were being made by authorities to determine the validity of concerns expressed by several individuals or groups. In many instances, authorities categorically dismissed claims made by valid participants. The management process in the GYE has been dominated by government agencies, with participation from the other groups being restricted to litigation, grassroots organizing, and commenting at public meetings, in other words, mostly antagonistic strategies. There has not been in-depth analysis of the validity of the concerns raised by stakeholders to test whether the common interest has been met.

Third, the pragmatic criterion calls attention to whether a policy is implemented well, tested to make sure it works, and adapted as needed in a timely fashion. A policy must be responsive and adaptable in achieving common goals as the context changes in order to satisfy the pragmatic test. Decisions must be carried out completely and in a manner consistent with the expectations of the participants in the decision making process (Steelman and DuMond 2009). Congruency between stakeholders'

expectations and their experience with a given policy is key in this test (Brunner 2002). Those community members who approve a policy should experience its application in practice in a manner consistent with their expectations.

Our observations suggest that thus far in the GYE, management decisions have not been carried out in a manner appropriate to meet pragmatic standards. Several stakeholders expressed their dissatisfaction with the manner in which management decisions have been practically carried out in the GYE. Our field notes are full of examples from diverse officials and others who made this point. The kind and degree of adaptation of official policy called for or needed is little evidenced in the cases we examined. Cases exist where management and policy process and outcomes do not approximate common interest standards. In contrast, some people, mostly working outside formal governmental structures, are striving toward a more inclusive, open, participatory system of problem solving and decision making that does meet these standards and pass common interest tests (examples below). These practitioners of adaptive governance seek systematically to use a proven strategy—contextual, multi-method, and inclusive—to address challenges in the region.

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RECOMMENDATIONS

Our rapid appraisal enabled us to gain as deep an understanding as possible of the issues at hand, recognizing that we are outsiders who spent a relatively short time in the arena. Conservation policy decisions within the GYE have clearly had unintended negative effects on community members and resources in some cases. Our recommendations here are designed to encourage common interest outcomes. In order to achieve more successful conservation, stakeholders must be willing to work hard at finding shared interests and building on them (Knight and Clark 1998). This requires creating arenas wherein people can work together to address problems of mutual concern (see Cherney et al. 2009). Finding and creating arenas in which people can explore their concerns in respectful ways is key to improving management in the region.

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Learn from practice-based, prototyping experiences

There are successful prototypes in the GYE and the surrounding region to learn from. It is a matter of harvesting this experience and diffusing useful prototypical elements

to other projects (Brunner and Clark 1997). For example, Glick and Clark (1998) describe the Beaverhead County Partnership, Madison Range Landscape Assessment and Adaptive Management Project, and the Henry's Fork Watershed Council as prototypes. These authors list common elements, including building social capital prior to working closely together, creating an arena for civic dialogue, giving stakeholders a genuine voice, recognizing the shared interests at stake, and focusing on monitoring and evaluation as the principal means to learn and improve.

Two other examples of successful prototyping that we discussed with people come from outside the GYE and offer lessons applicable to the GYE. First is the Blackfoot River system case (Wilson 2006). Seth Wilson and others have been working with the Wildlife Committee of the Blackfoot Challenge near Missoula, Montana, for years (Wilson et al. 2006, 2007, Wilson and Clark 2007). The Blackfoot Challenge is a landowner-based group that coordinates management of the Blackfoot River watershed, its tributaries, and adjacent lands. In 2002 the Wildlife Committee was formed in response to increasing numbers of grizzly bears, wolves, and other predators that were using privately owned valley bottom habitat and creating concerns among residents, many of whom work in the ranching business. While working closely with ranchers and conservation groups, Wilson sought innovative, yet practical, measures to reduce conflicts with bears. He advocates long-term community participation in management of cattle and sheep. He told us that "folks who have been in [a conflicted locality] a while have a lot to offer" and that engaging them directly is essential.

His approach considers local residents as a valuable resource of information about conflicts and trends, and he capitalizes on local insight to create prototype projects adapted to local situations (Wilson et al. 2006). These small-scale projects allow citizens and managers to find out what works in one situation and then adapt and sometimes scale up the prototype to create successful and mutually beneficial outcomes throughout a region. These efforts are combined with the use of GIS and mapping skills to build a creative framework that brings sound intelligence to the forefront and allows for adaptation and self-correction. The work of Wilson and his associates has been highly successful in reducing grizzly bear-livestock conflicts.

Second is a case in Banff National Park, Alberta, where Michael Gibeau of Parks Canada and his colleagues organized grizzly bear management workshops that took place over two years. These were designed to increase the skill level, contextual understanding, and problem-solving capacity of the participants (Rutherford et al. 2008). Importantly, he sought to create opportunities for all involved to increase respect and to shape and share values. Gibeau created a new arena and a new social and decision process that worked at many levels. The workshops helped participants defuse the deeply polarized conflict, develop practical insight and a more comprehensive perspective on the grizzly bear management process, create mutual respect among participants, enhance trust, and increase cooperation directed at practical problem solving. The key to success in this case was improving the problem-solving skills of the participants. These workshops helped people to clarify and secure their common interests concerning several grizzly bear management issues, such as trail use.

These and other examples are a treasure trove of lessons waiting to be harvested and diffused throughout the region. In turn, lessons can be applied to other situations or adapted. This is the practice-based, prototyping process.

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Create new arenas for community-based participation

Participatory, community-based processes hold great promise for producing enduring practices for large scale conservation cases (see McLaughlin et al. 2005, Wilkinson et al. 2007). Action and dialogue should be interwoven so that citizens can make headway in solving practical problems (Wilson and Primm 2004). Workshops and fieldwork may be included as Gibeau and Wilson did in their cases.

Efforts by Steve Primm, who works in the Madison Valley, Montana, on grizzly bear conservation and other issues, provide two more good examples (Primm and Wilson 2004). Primm works with individuals, agencies, and conservation groups through practice-based prototyping, engaging in hands-on projects to facilitate coexistence between carnivores and people (Primm 1996, 2000). He has worked very closely with ranches in the Madison Valley affected by conflicts for over a decade (Wilson and Primm 2005). He believes that it is important to recognize that people's objections to carnivores are legitimate and valid, and that whenever possible local people who know the situation best should design the solution. Primm's approach is based on a formula of long-term community participation, working with locals on their terms, and in settings comfortable and familiar to them. He seeks to determine how conservation goals can be achieved by respecting participants and encouraging them to find common ground (Primm and Clark 1996). This formula is practice-based prototyping, constantly exploring opportunities for concerned people to develop successful processes for turning experience and reason into sound public management and policies (Primm 1996).

Second is the Northern Rockies Conservation Cooperative (NRCC), based in Jackson, Wyoming. This NGO works in the region and beyond, with projects and associates in Canada, Mexico, and other countries (Wilmot 2004a,b, 2005, Wilmot and Dixon 2004a). NRCC has been an organizational home for Seth Wilson and Steve Primm for the past 15 years as well as 20-plus other research associates working on diverse projects. Most use practice-based prototyping to address complex wildlife problems. Avery Anderson (2007) and her colleague Rebecca Watters (2007) worked with the ranching community in the Green River Valley of Wyoming on conflicts with wolves. Elizabeth Deliso (2007) worked on elk management in western Wyoming.

NRCC was founded in 1987 and combines a commitment to human communities with scientific expertise through place-based, adaptive governance approaches. According to its website, "This intersection between ecological science and social context is where NRCC makes its greatest contributions" (www.nrccooperative.org).

Unlike most NGOs in the GYE or elsewhere, NRCC focuses on clarifying and securing the common interest through prototyping. NRCC's goals are accomplished by analyzing complex management and policy problems, bridging science and policy for practical solutions, building trust and facilitating dialogue among diverse people and interests, creating learning networks for conservation practitioners, developing leadership and analytical skills in others, and fostering creative and interdisciplinary approaches to problem solving (Wilmot 2007a). Further, NRCC gives particular attention to improving the decision-making process and to developing conservation prototypes (www.nrccooperative.org; Wilmot 2004a, 2005, Wilmot and Dixon 2004 a,b). One of NRCC's projects is the Greater Yellowstone Conservation Directory (Northern Rockies Conservation Cooperative and Charture Institute 2007). It has helped organize the arena by making people more aware of each other's work in order to avoid duplication, increase collaboration and use scarce resources more efficiently.

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Jason Wilmot, the group's executive director, is a wolverine ecologist. Wolverine conservation in the GYE is another potentially intractable controversy (Wilmot 2007b, 2008). Wilmot works as the field director of the Absaroka Beartooth Wolverine Project, which is a collaborative, large scale conservation effort between Rocky Mountain Research Station, Yellowstone National Park, NRCC, and others. Beyond his research efforts to acquire a better understanding of wolverines and the threats to their survival, he is trying to maintain a dialogue between conservation groups and the federal and state agencies responsible for the species' management. People like Wilmot, who function as "insiders," able to maintain a dialogue with all stakeholders, are well equipped to create an inclusive decision process and arena to improve management and develop stronger links between science and policy.

These people and examples are a few among others in the region. They are proving successful and could be joined or replicated by others.

Adopt the adaptive governance framework in problem solving

Our analysis, based on our experiences as well as literature on adaptive governance, strongly indicates that the situation in the GYE would be significantly improved through use of this more complete and practical framework. Adaptive governance emphasizes adjusting current decision-making processes to actual, on-the-ground situations. It also calls for continually evaluating whether those efforts and policy decisions are effectively moving toward enduring, common interest outcomes. Constant review and learning are keys to successful adaptive governance.

As a flexible framework for policy making, adaptive governance closely evaluates how policies are actually performing and affecting the community on the ground (Brunner et al. 2005). This bottom-up, contextual approach is proving more effective

in achieving conservation gains than the traditional approach of scientific management. The use of scientific research, data, and technology as the foundation for environmental policy often lacks the holistic approach necessary to create sustainable and effective policy. Although science is critical in decision making, it alone is not an adequate basis for sound policy making. Adaptive governance addresses the politics and science simultaneously in pursuit of the common interest (see Brunner et al. 2002).

An important step toward adaptive governance is to accept that the current governing policies are not adequately addressing many issues at hand (Brunner et al. 2005). Managers and policy makers need to realize that instead of using scientific data alone, ideal decisions stem from using scientific knowledge in addition to local and traditional knowledge (Wilkinson et al. 2007). Moreover, decisions need to be community based. This strategy upholds the idea that the common interest is an achievable combination of individual interests of the community.

One of the most important aspects of the adaptive governance approach is its commitment to reviewing management policies, adjusting them, or occasionally abandoning them for better ones. Management and policy can be modified as the context of the issue changes. Managing carnivores and natural resources in the GYE, for example, requires an ability to define what the problems are and to create decision-making processes that are inclusive, constructive, and balanced and that meet the three tests of the common interest. Successful management to date shows this to be true. The governance problems that exist in the GYE can only be addressed if parties are able to meet and work toward common ground solutions.

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CONCLUSION

Our rapid assessment showed that conservation management and policy, as evidenced in the programs we surveyed (e.g., grizzly bear and wolf management, snowmobile use, tourism, and others) and the people we talked with, are fraught with conflicting perspectives and contested problem definitions and are fueled by symbol inflation and politics. The participants whom we interviewed and read about described the need for a new, respect-based approach to management and policy. They recognize that science is essential and must be understood in the broadest context. They feel that a new problem solving, multi-method, contextual approach could help defuse antagonism and gridlock in the many impassioned issues in the GYE today. We recommend a transition to adaptive governance as an overarching paradigmatic framework to address management and policy problems. This could be achieved by using the practice-based, prototyping approach proven to be successful

through field trials, based on a growing number of successful examples carried out by creative, committed, and skilled people in the GYE (Clark 2008).

The promise of practice-based prototyping for identifying and securing common interest outcomes in the GYE lies in the fact that this approach provides a unique platform for creating a process that is more inclusive, capable of harnessing local knowledge and experience, and bridging the divide between science and the practical measures needed for effective conservation. This approach also fosters what is currently missing in the GYE—respect and pursuit of human dignity as an overarching goal. We see that adaptive governance can help participants in the region to work toward a practical, functional, and inclusive process to protect resources and values in this highly complex and symbolically charged, yet beautiful and widely treasured, ecosystem.

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