



Research, part of a Special Feature on [Exploring Opportunities for Advancing Collaborative Adaptive Management \(CAM\): Integrating Experience and Practice](#)

Do Adaptive Comanagement Processes Lead to Adaptive Comanagement Outcomes? A Multicase Study of Long-term Outcomes Associated with the National Riparian Service Team's Place-based Riparian Assistance

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ABSTRACT. Adaptive comanagement (ACM) is a novel approach to environmental governance that combines the dynamic learning features of adaptive management with the linking and network features of collaborative management. There is growing interest in the potential for ACM to resolve conflicts around natural resource management and contribute to greater social and ecological resilience, but little is known about how to catalyze long lasting ACM arrangements. We contribute to knowledge on this topic by evaluating the National Riparian Service Team's (NRST) efforts to catalyze ACM of public lands riparian areas in seven cases in the western U.S. We found that the NRST's approach offers a relatively novel model for integrating joint fact-finding, multiple forms of knowledge, and collaborative problem solving to improve public lands riparian grazing management. With this approach, learning and dialogue often helped facilitate the development of shared understanding and trust, key features of ACM. Their activities also influenced changes in assessment, monitoring, and management approaches to public lands riparian area grazing, also indicative of a transition to ACM. Whereas these effects often aligned with the NRST's immediate objectives, i.e., to work through a specific issue or point of conflict, there was little evidence of long-term effects beyond the specific issue or intervention; that is, in most cases the initiative did not influence longer term changes in place-based governance and institutions. Our results suggest that the success of interventions aimed at catalyzing the transformation of governance arrangements toward ACM may hinge on factors external to the collaborative process such as the presence or absence of (1) dynamic local leadership and (2) high quality agreements regarding next steps for the group. Efforts to establish long lasting ACM institutions may also face significant constraints and barriers, including existing laws and regulations associated with public land management.

Key Words: *adaptive comanagement; collaborative processes; evaluation; U.S. West*

INTRODUCTION

Paradigms guiding natural resource management during the previous century, based on assumptions of regular and predictable ecological patterns, are no longer considered sufficient for addressing dynamic and uncertain future environmental threats (Armitage et al. 2009, Lawler et al. 2010). The reliance on command-and-control governance for regulating environmental use, for example, is regularly called into question by scholars and practitioners, and is seen as insufficient for equitably addressing the diversity of social and ecological interests, needs, and pressures on environmental resources (Ansell and Gash 2008, Armitage et al. 2009). Alternative approaches to governance of natural resources are needed to enhance the resilience of social-ecological systems (SESS), improving their capacity to adapt to complex and uncertain environmental threats.

One approach to the governance of natural resources receiving increased attention is collaborative adaptive management, commonly called adaptive comanagement (ACM). ACM combines the learning and experimentation aspects of adaptive management with the linking and participation features of collaborative or cooperative management (Olsson et al. 2004, Armitage et al. 2007). Hailed as a novel approach to natural

resource governance, ACM is thought to build the resilience of SESS, thereby enhancing system adaptability (Tompkins and Adger 2004). Although there is an extensive literature on institutional transformation toward more collaborative processes (e.g., Ostrom 1990, Schneider et al. 2003, Ostrom and Basurto 2011), the processes by which governance arrangements transition to ACM in particular are not well understood (Huitema et al. 2009, Plummer 2009). Adaptive comanagement is considered a self-organizing process that is not easily implemented from the top down (Olsson et al. 2004, Folke et al. 2005). Certain conditions are thought to influence the self-organizing process of adaptive comanagement, including the presence of a real or perceived crisis, policy windows and enabling legislation, and existing system variables related to culture, knowledge, and power (Plummer 2009). A number of processes thought to enable the transition to adaptive comanagement characterize it at the same time. For example, social learning, cross-scale networks, and the development and deployment of social and human capital are essential features of adaptive comanagement; but these same characteristics are also thought to be processes through which adaptive comanagement can emerge (Plummer 2009). As more academics, practitioners, and government officials alike

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become interested in strategies for enhancing the adaptability and resilience of SESs, these processes offer guidance for creating opportunities for adaptive comanagement to emerge. It is unclear, however, whether simply employing the recommended processes will result in enduring ACM institutions.

In this paper we seek to contribute to a better understanding of the opportunities and limitations outside interventions face in catalyzing the emergence of ACM. To this end, we employed an empirical case study approach to evaluate a government-led initiative aimed at enhancing place-based capacity for ACM of public land riparian resources in the western U.S. The approach employed by this initiative aligns with a number of processes cited in the ACM literature, including a context-specific focus on power sharing, trust building, social learning, and problem solving. By comparing outcomes of this initiative to those described in the ACM literature, our research produced empirical findings that contribute to scholarship on the processes and conditions that shape the emergence of ACM. Our findings also point to practical applications for governments, practitioners, and organizations seeking to facilitate more lasting adaptive and collaborative approaches to natural resource management.

In the following pages we present findings from seven case studies of the National Riparian Service Team's (NRST) activities in public rangelands contexts throughout the U.S. West. We hypothesized that what the NRST refers to as "multi-phased riparian assistance" might serve as a model for efforts to catalyze ACM in certain geographic contexts. Our research focused on the following questions: (1) Does the NRST's assistance help catalyze ACM of riparian resources?; (2) What factors contribute to or detract from the success of outside interventions designed to build capacity for ongoing ACM?

The National Riparian Service Team

The National Riparian Service Team (NRST, or Team) is a federal interagency unit charged with implementing and coordinating a joint initiative of the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). The initiative is implemented through a variety of approaches, including coordination of a network that includes multiorganizational, interdisciplinary teams in a number of western states and Canada. One of the more innovative aspects of initiative implementation is through the NRST's riparian assistance program, called "Multi-Phased Service Trips" (Service Trips).

Service Trips are a series of place-based interventions in which assistance is provided to agencies and communities across the U.S. West as they confront conflicts over rangeland riparian management issues. Service Trips focus on "providing training and assistance in implementing successful collaborative adaptive management processes for riparian areas which are dependent upon blending biophysical and

social dimensions" (NRST 2009:7). A Service Trip generally involves multiple visits to one site to assist community members and agencies dealing with specific challenges surrounding riparian management. The request for NRST's assistance can be initiated from within the local federal land management agency, e.g., a USFS district, or by community members or groups. Based on the results of a situation assessment, and in coordination with a local ad-hoc planning group, a multiphased assistance process is developed that includes meetings, workshops, trainings, and field days that occur over the course of months or, in some cases, even years.

Service Trips are designed to guide diverse groups through a process of identifying issues, learning about the issues and each other, and developing place-based strategies to collectively move forward. Most Service Trips begin with a day or two of indoor sessions in which a significant portion of time is dedicated to exploring various perspectives and information pertaining to the current state of knowledge regarding the resource concern or issue. The Team then uses field-exercises in which the group participates in dialogue and discussion and practices a field-based assessment method to assess the current condition of the riparian area(s) in question and identify factors limiting riparian function.

The ultimate goal of Service Trips is to build capacity to create change. Service Trips strive to build technical and social capacity within a group to improve issue-specific decision making and coordination in a fixed time and place. Although it is not their primary purpose, the hope is that the NRST's assistance will result in longer term outcomes that align with the principles of ACM. In this study we investigate the extent to which, if at all, Service Trips influence the emergence of institutions that support ongoing ACM of riparian resources.

A framework for evaluating adaptive comanagement

Berkes (2009) contends that adaptive management and collaborative management practitioners and scholars are evolving toward practices reflective of ACM because "adaptive management without collaboration lacks legitimacy, and comanagement without learning-by-doing does not develop the ability to address emerging problems" (Berkes 2009:1698). No single framework or prescription defines ACM; rather, ACM arrangements are typified by shared characteristics that manifest in different configurations according to the place-specific context (Plummer and Hashimoto 2011). Characteristics of ACM common across the literature include: an emphasis on cross-scale networks; self-organizing institutions and governance arrangements capable of supporting cycles of learning-from-action (adaptive management); decision-making through communication and negotiation; the formation and deployment of social and human capital; and processes of social learning (Olsson et al. 2004, Folke et al. 2005, Stringer et al. 2006, Cundill and Fabricius 2010).

The heterogeneity of ACM processes and outcomes pose a challenge for evaluation. Plummer and Armitage (2007) propose an approach whereby outcomes thought to contribute to the attainment of ecological sustainability and sustainable livelihoods, the ultimate parameters of concern in ACM, are assessed. Their approach closely follows that of Innes and Booher (1999), who developed an evaluation framework that identifies process characteristics and first-, second-, and third-order outcomes of consensus building processes. First-order outcomes occur immediately after an intervention and commonly include increased individual knowledge, development of shared understandings, and improvements in trust, relationships, and communication. Second-order outcomes, such as behavioral change, are closely connected to the specific assistance, while third-order outcomes are longer term effects that extend beyond the problem domain being addressed but can still be attributed, in part, to the process in question (Innes and Booher 1999). Plummer and Armitage adapt Innes and Booher's framework by including characteristics specific to ACM, such as connections across multiple scales. Many of Innes and Booher's indicators for evaluating collaborative planning and consensus building processes remain pertinent, in large part because they situate their approach to consensus building within a complexity science perspective, emphasizing feedback loops and the self-organizing features of adaptive systems. We adopted features from both of these frameworks to guide our analysis (Table 1).

METHODS

A multicase study approach was chosen that allowed us to make comparisons between cases and identify variables that contributed to or impeded the achievement of outcomes reflective of ACM. Case studies were purposively selected based on their representation of the diversity of situations addressed and assistance types provided. Each Service Trip is referred to by the name of the nearest town (Table 2).

A combination of purposive and quota sampling was used to select past-participant interviewees. Approximately half of all interviews were with agency personnel, a quarter were with ranchers, and a quarter were with individuals representing environmental or other interests. In total, 54 interviews were completed; names of interviewees are not included to protect confidentiality. We also conducted focus groups with NRST staff and primary consultants for each case study and analyzed a large array of background documentation for each Service Trip. Review and analysis of this documentation helped provide a deeper contextual understanding of processes employed in each case, and allowed us to cross-check interviewee perceptions of the process with documentation from those events.

We used QSR NVivo 9 software to code and analyze the data. The coding strategy utilized both predetermined and emergent codes (Patton 1997, Berg 2004); predetermined codes were

based on the evaluation framework presented in the previous section, and open coding was utilized to identify emergent themes relevant to situational characteristics of each case. Coding of interviews and focus groups and analysis of background documentation informed the development of the seven individual case studies. Cases were then analyzed in aggregate to identify commonalities and differences.

RESULTS

Process characteristics

Service Trip processes employed by the NRST, by-and-large, reflect processes characteristic of ACM. Table 3 outlines our findings for each process criteria included in the evaluation framework.

First-order outcomes

We identified a number of first-order outcomes, including improved knowledge, relationships, and trust. Table 4 provides exemplar quotes for two of the three first order outcome variables assessed in this study.

Completion of formal riparian assessments using joint fact-finding was a tangible outcome of many Service Trips that helped develop "agreed upon data" (Innes and Booher 2010) and shared understanding. Table 5 describes riparian assessments completed during each of the seven case studies.

In regard to the final first-order outcome listed in our conceptual framework, i.e., resolution and development of agreement, the NRST's inclination and ability to facilitate agreement or 'next steps' that groups would take after the assistance concluded differed in each of the cases. In two of the seven cases (Enterprise and Lewistown), the Service Trip included processes specifically designed to facilitate the development of informal agreement on how to move forward. In the five other cases the NRST helped facilitate dialogue and the development of creative suggestions for problem solving, but not deliberation or negotiation over specific steps that could be taken to improve the situation. None of the Service Trips profiled here directly facilitated the development of formal agreements or compacts.

Second- and third-order outcomes

Changes in practices

Changes in individual practices influenced by Service Trip participation varied across each case. For example, a number of Springerville interviewees felt that their ability to implement monitoring activities had improved. In the Lewistown case, agency staff reported that the NRST assistance had improved their ability to perform a riparian assessment on a large river system. Other interviewees noted that although they had not made any specific changes as a result of their Service Trip participation, they took riparian area function into consideration now more than before. Only

Table 1. Evaluation framework.

	Criteria	Description
Process Criteria	Communication and negotiation Pluralism and linkages	Communication and dialogue support shared understanding and the exchange of perspectives Diverse interests are involved representing multiple perspectives and fostering connections across scales
	Social learning	Processes support changes in understanding that occur within communities of practice through interaction between actors within a social network; multiple loop learning encourages cycles of reflection and modifications
First-Order Outcomes (immediate outcomes of specific initiative)	Social and human capital	Increased trust and improved relationships among participants; improved knowledge and abilities
	Shared understanding	Alignment of individual understandings across the group, improved understanding of others' points of view; development of agreed upon data
	Agreement on steps toward resolution	Resolution of immediate conflict or issue being addressed by initiative, or agreement on action steps to work toward resolution
Second- and Third-Order Outcomes (occurring subsequent to conclusion of intervention)	Changes in practices	Individual and collective actions occur, e.g., changes in land management; implementation of agreements
	Cross-scale linkages	New or improved horizontal and vertical linkages between participants, organizations, and resources at different scales continue; new partnerships developed
	Modified or new governance arrangements	Institutional arrangements developed or modified capable of supporting ongoing collaborative and adaptive management processes

Criteria and descriptions synthesized and adapted from: Innes and Booher 1999, Keen et al. 2005, Plummer and Armitage 2007, Plummer and FitzGibbon 2007, Brummel et al. 2010, Reed et al. 2010.

Table 2. Service Trip case studies. BLM = Bureau of Land Management.

Case Study	Area of Assistance Focus	Host Agency/Organization	Assistance Time Frame	Interviews
Springerville, AZ	Springerville, Alpine, and Clifton Ranger Districts	Apache-Sitgreaves National Forest & Ranching Heritage Alliance	2008-present	10
Lander, WY	Green Mountain Common Allotment	BLM, Lander Field Office	2003-2004	11
Lewistown, MT	Upper Missouri River Breaks National Monument	BLM, Lewistown Field Office	2008-present	10
Colville, WA	Little Pend Oreille National Wildlife Refuge	U.S. Fish and Wildlife Service	2007	9
Prineville, OR	North Fork Crooked River	Ochoco National Forest, Paulina and Lookout Mountain Ranger Districts	2003-2004	5 [†]
Winnemucca, NV	Martin Basin Rangeland Project Area	Humboldt-Toiyabe National Forest, Santa Rosa Ranger District and Nevada Department of Agriculture	2005-2006	5 [†]
Enterprise, OR	Swamp Creek	Wallowa-Whitman National Forest, Wallowa Valley Ranger District	2004	4 [†]

[†]Three of the seven case studies had already been partially analyzed by the National Riparian Service Team themselves (NRST 2009). The studies were informed by brief, informal interviews with key participants. We included these studies but built upon them with additional interviews and document analysis.

Table 3. Adaptive comanagement process characteristics employed by the National Riparian Service Team (NRST).

Process Characteristic	Processes employed by the NRST that align or diverge.
Pluralism and Linkages	Stakeholders engaged in Service Trip process, by and large, represent a diversity of interests (government employees, rancher-permittees, concerned citizens, environmental interests). Representatives from multiple scales participated in all or part of each Service Trip. Some key environmental interests declined or ceased to participate at some point during the process in four of seven cases. Enlisting and maintaining the participation of higher-level federal agency staff (e.g. Forest Supervisors Office staff) was problematic in at least four different Service Trips. Rancher-permittees actively boycotted further Service Trip processes in Lander case.
Communication and Negotiation	Joint-fact-finding approach helped develop shared understanding and agreed upon data. Facilitated dialogue improved understanding of, and appreciation for, others' perspectives. Group norms are established that honor open and respectful communication.
Transactive decision making	Consensus building processes facilitate dialogue and discussion soliciting diverse and creative suggestions for improving the situation. In two of seven cases, consensus processes were employed to facilitate deliberation and informal agreement; none of the cases included the development of formal compacts or agreements. Joint-fact-finding and consensus building approaches consider multiple forms of knowledge side-by-side (e.g. scientific and local ecological knowledge).
Social Learning	Following Reed et al.'s (2010) definition of social learning, Service Trips (1) aim to effect a change in participants' understanding about riparian function and resolution of riparian-related conflicts and issues, (2) situate themselves within communities of practice, and (3) involve face-to-face dialogue and interaction between actors within networks. Processes supportive of single-loop learning fostered via learning from past management actions, reflecting on the effects of those actions, and developing options for modifying future actions. Double-loop learning processes employed through facilitation of self-reflection aimed at provoking participants to consider their own values, feelings, and worldviews, and how these differ from other participants. With the exception of the Springerville case, longer term learning processes did not appear to become embedded in communities of practice or governance arrangements as a result of the assistance.

Table 4. First-order outcomes (representative quotations). NRST = National Riparian Service Team; BLM = Bureau of Land Management.

Outcome Criteria	Representative Quotes
Improved knowledge and abilities (human capital)	"I personally, certainly learned a great deal. I did a lot of facilitation work when I was consulting, and there were definitely some skills that I picked up from that group. Just their willingness number one to pick up the phone and call and just to hash out problems with individuals or small groups, was just I think really neat." [A-3] "They showed different species of brush in a riparian area and grasses and how riparian areas change. I mean, it was really an education." [B-8] "The biggest asset [of the NRST] was their ability to use a common language with landowners and to present the fact that cows and creeks can go together." [G-9]
Improved relationships and trust (social capital)	"[Participants] spent time together both listening to presentations ... and then five days in the field together ... That much time together enables you to start talking, develop a relationship ... It was very beneficial." [E-1] "I think [relationships have] changed a lot in terms of permittees believing that they can work with the Forest Service, with U.S. Fish and Wildlife Service, that there is the capacity for change." [F-1]
Shared understanding	"The [small group of] folks that ... were involved in the PFC assessment process, the pre-meetings and the actual assessment now are able to speak in a common language and understand what everybody is saying." [H-9] "The sessions have been extremely valuable to me in that I hear what the ranchers are thinking, what they're watching, [and] the impacts that our decisions have on them and our government red tape has on them." [F-5] "I think the facilitation was important to get everybody talking the same language. The BLM doesn't talk 'permittee' and vice-versa." [A-6]

a handful of interviewees cited specific changes they had implemented in their grazing management that were attributable to their Service Trip participation, and a small number of individuals also reported changes or improvements in their approach to facilitating and working with diverse groups of stakeholders.

Service Trips also influenced changes in agency or group practices. Table 6 provides examples of improvements to riparian monitoring that can be attributed to NRST assistance. Similarly, Table 7 describes ways in which NRST assistance has influenced riparian management activity, as related to the objectives of the specific Service Trips.

Last, it is unclear the extent to which groups and agencies who implemented monitoring or management changes integrated them into an adaptive management cycle, particularly as part of a collaborative approach. In some cases it is too early to tell if groups and agencies are using information gained from these activities to later evaluate and collectively learn from the effects of management changes. Such is the case in Springerville and Lewistown, where significant inroads to developing monitoring protocols were made quite recently.

Cross-scale linkages

In all cases, Service Trips were found to strengthen or increase linkages between participants, organizations, and resources at varying levels. Strengthened vertical linkages, i.e., hierarchical connections between local and regional/national actors and institutions, were especially evident in the Springerville case. Here, the NRST provided a forum for participants to interact not only with others from their immediate area, but also with the U.S. Fish and Wildlife Service, staff from University of Arizona Cooperative Extension, and the Region 4 office of the USFS. These connections continue to be supported and developed outside of the NRST's assistance through the local ranching group that was formed.

Service Trips also helped to strengthen horizontal linkages between different groups at the local level, which in some cases improved their ability to mobilize resources. As a result of the Lewistown Service Trip, for example, the Upper Missouri River Breaks National Monument (UMRBNM) BLM staff was able to enlist the support of the Friends of UMRBNM group in the installation of a test enclosure fence along the Missouri River, in spite of their historically adversarial relationship. Other examples of horizontal linkages include involvement from county soil and water conservation districts, county commissioners, and local environmental groups.

Extension of cross-scale networks beyond the scope of the NRST's assistance, however, most often occurred among individuals rather than groups. Where relationships between actors representing diverse interests were strengthened, there

was continued sharing of resources and expertise among the individuals. For example, in one case a fish biologist with the U.S. Fish and Wildlife Service became more familiar with a rancher-permittee involved in the Service Trip; the more trusting relationship that developed continued beyond the Service Trip. According to the fish biologist,

I have since been in contact with [the permittee] at other meetings, and I've called him a couple of times to try and gain that trust and maintain, you know, some sort of relationship with that person. So without ... that opportunity to meet him [at the NRST Service Trip] I would have never done that. [C-1]

Such linkages, however, generally did not extend beyond individual relationships. Springerville and Lewistown offer notable exceptions to this, where some portion of these groups have continued to work together on additional issues within the original problem domain. Furthermore, the focus of the Springerville group has expanded beyond the original problem domain (riparian management). Through a self-organizing process, the Springerville group now provides educational opportunities related to a wide range of sustainable ranching practices and concerns such as Mexican Gray Wolf and elk issues, economic opportunities related to niche marketing and certification, and upland range management. By addressing issues beyond riparian management concerns, an expanded network has developed.

Modified or new governance arrangements

We conclude our presentation of results by assessing the extent to which Service Trips influenced changes in governance arrangements capable of supporting ongoing collaborative adaptive management processes. Table 8 provides a summary of our findings.

Springerville presents the most compelling evidence that the initiative influenced lasting changes to a group's collaborative and adaptive approach to riparian management. One of the effects of the first Springerville session facilitated by the NRST was the participants' idea to develop a ranching collaborative, which eventually became the Ranching Heritage Alliance (RHA). The group subsequently requested the NRST's assistance to help them improve their collaborative capacity. As a result, a number of NRST consensus building techniques and tools have been integrated into the RHA's approach. The NRST's assistance provided a forum for the future group's ideas to surface, and, significantly, self-organize into an entity that integrates some of the practices characteristic of ACM, e.g., a focus on collaborative learning and improved monitoring.

In regard to the Lewistown case, it is too early to tell how, if at all, the NRST's assistance has influenced lasting changes to governance institutions. A spin-off group did self-organize as a result of the Service Trip assistance and is now seeking

Table 5. Riparian assessment. NRST = National Riparian Service Team.

Case	Riparian Assessments Completed
Springerville	Formal assessments completed as part of training exercises
Lander	Field-based joint fact finding employed to assess riparian condition, no formal assessment conducted
Lewistown	Formal assessment completed with NRST assistance on the Missouri River
Colville	Not applicable
Prineville	Formal assessment completed in 2004 as part of assistance
Winnemucca	Formal assessments completed on two streams as part of assistance
Enterprise	Two days of Service Trips involved field-based joint fact finding using an assessment framework; formal assessment not conducted

Table 6. Riparian monitoring influenced by the National Riparian Service Team's (NRST) assistance.

Case	Changes to Riparian Monitoring
Springerville	Training in implementation and utilization of monitoring protocol by Forest Service and permittees is ongoing. Riparian monitoring sites were installed and monitored as part of 2010 NRST training. Sites were read again in 2011.
Lander	None
Lewistown	Work to incorporate assessment findings into monitoring plans currently underway; process is ongoing at the time of writing.
Colville	None
Prineville	Photo-point monitoring implemented in areas of concern after assistance, other recommended monitoring was not implemented. Reassessed select reaches with help of NRST in 2008.
Winnemucca	Monitoring protocol developed on two streams as part of assistance; unable to reach current Forest Service staff to find out about implementation.
Enterprise	Baseline and long-term monitoring plans for allotment developed by group as follow-up to NRST's assistance; monitoring strategy has been implemented consistently since assistance conclusion in 2004.

Table 7. Riparian management influenced by the National Riparian Service Team's (NRST) assistance.

Case	Riparian Management Influenced
Springerville	Various changes to Forest Service allotment grazing management indirectly influenced by assistance.
Lander	None reported. However, ideas generated during assistance have persisted in later EIS drafts.
Lewistown	Experimental riparian enclosure built with help of Friends of the Monument; planning for weed management program underway to include public involvement; spin-off group formed to work toward changing dam flows (still underway).
Colville	Not applicable (decision to uphold elimination of economic grazing program from Refuge upheld by courts).
Prineville	Grazing on a stream reach rated "functioning at-risk" was eliminated for three years; sections of river corridor closed to firewood cutting; riparian shrubs planted; environmental assessment for one allotment completed.
Winnemucca	None reported
Enterprise	Existing grazing program on allotment deemed appropriate to support improving riparian function; restoration objectives adjusted to account for site potential.

Table 8. Modified or new governance arrangements.

Case	Riparian Management Influenced
Springerville	Emergence of self-organized learning group; permittees and Forest Service staff more willing and comfortable coordinating
Lander	No evidence of long-term changes
Lewistown	Self-organized group working on dam reoperations issue
Colville	No evidence of long-term changes
Prineville	No evidence of long-term changes
Winnemucca	Little evidence of long-term changes
Enterprise	Existing collaborative groups integrate information, but no change influenced

to address a more complex issue, coordinating changes in the timing of flow releases from hydroelectric dams on the Missouri River to address problems associated with lack of cottonwood regeneration in riparian areas, among other flow-related issues. The time-horizon for the group coordinating the dam flow discussions is unclear; depending on the outcome of negotiations, this group may phase out, or it could continue to self-organize as a longer-term cross-scale network. If the group does continue into the future, it is too early to tell the extent to which it will support processes of ACM.

In contrast to Springerville and Lewistown, our other cases displayed little evidence of the formation of spin-off groups or altered institutional arrangements. In the Enterprise case, a collaborative approach was already in existence, so it was unclear if the NRST's assistance had an effect on their approach to collaborative riparian management. Because the majority of the NRST's assistance in this case was focused on addressing technical aspects because of the group's existing collaborative capacity, it is unlikely that the Service Trip had a high degree of influence on the group's collaborative capacity. Conversely, in the Colville case, the high degree of community conflict over grazing on the Little Pend Oreille National Wildlife Refuge remained unchanged after NRST's work there, most likely because of antecedent conditions involving a lawsuit; when the elimination of grazing on the Refuge was upheld by courts in the middle of the NRST's three-day community workshop, the NRST's assistance was no longer desired by the community.

In sum, few of the case studies exhibited evidence that the NRST's assistance had a lasting effect on the specific processes these groups and agencies used to make decisions, engage stakeholders and work with diverse groups. New or altered long-term approaches to governance that support ongoing learning and collaboration have typically not emerged.

DISCUSSION

The NRST's Service Trip approach offers a relatively novel model for integrating joint fact finding, multiple forms of knowledge, and collaborative problem solving to improve public lands riparian grazing management. With this approach, learning and dialogue often helped facilitate the development of shared understanding and trust. Service Trips have also influenced changes in assessment, monitoring, and management approaches to public lands riparian area grazing. Although these effects often aligned with the immediate objectives of the Service Trip, i.e., to work through a specific issue or point of conflict, there was little evidence of long-term effects beyond the specific issue or intervention; that is, in most cases the initiative did not influence longer term changes in place-based governance and institutions.

Despite these findings, it is important to note that the Service Trips did have a significant effect on other more intangible

first-order outcomes. These outcomes, which are considered essential to the overall collaborative adaptive capacity of groups, included increased trust, improved relationships, joint learning, shared understanding, and development of new partnerships. All of these outcomes are likely to increase the ability of groups and individuals to work together more effectively in the long term, and in a number of cases they contributed to the achievement of site-specific management and monitoring outcomes. Although processes supporting the ongoing maintenance of these outcomes were generally not embedded in governance institutions, they may still have resulted in cumulative effects that were undetectable to us considering the array of variables and factors that contribute to and detract from system adaptability. Thus, the cumulative effects that the NRST's interventions influenced across larger scales may be significant.

Our findings echo existing scholarship on collaborative governance, by demonstrating that factors external to the collaborative process influenced their outcomes (Koontz 2005, Ansell and Gash 2008, Campbell et al. 2011). In the Springerville case, local leaders served as change agents willing and able to leverage resources; a critical factor in the emergence of the self-organized learning group. Without leaders serving as local change agents, NRST's ability to build capacity would have been greatly diminished, and the emergence of an alternative governance arrangement unlikely. In the Enterprise case, existing collaborative capacity was thought to be high; this was critical to the NRST's ability to work with the group to overcome an impasse regarding a technical/scientific disagreement. Conversely, the Lander, Colville, and Winnemucca Service Trips were subject to high levels of existing conflict and distrust, and thus resulted in fewer lasting outcomes. These cases all point to the importance of antecedent conditions, context, and situational factors; in places with existing forms of capacity and capital, be it the presence of facilitative leadership or a history of collaboration, interventions are more likely to be effective in the long term.

Second, the temporal scale of the issue being addressed may be a factor influencing longer term outcomes. Perhaps one of the reasons the Service Trips, save for Springerville, yielded few second- and third-order outcomes was because they typically focused on a site-specific riparian area management issue. The capacity-building aspect of the assistance may be overlooked when the issues being addressed have a limited time-horizon. Agency managers and stakeholders may view Service Trips simply in terms of another compliance exercise designed to achieve near term objectives. Once a "solution" to the issue at hand is devised, there may be little incentive to continue collaborative processes into the future.

The Springerville case provides a notable exception to this, where the focus was on developing tools for sustainable

grazing and collaborative management, rather than on resolving one particular riparian management conflict. Here, many participants from the ranching community felt that their long-term livelihoods were threatened by a multitude of factors, including the potential that grazing could be eliminated from riparian areas on the National Forest. The potential for crisis may have led some to see the need to self-organize and explore options for learning new practices and approaches to ensure that ranching on public lands remained sustainable in the long term. Thus the temporal scale of the issue may be an important factor determining the likelihood of ACM arrangements emerging.

Last we consider the extent to which the development of high-quality agreements influenced longer term outcomes. In five of our seven cases, the NRST's efforts to facilitate agreement generally ended with the development of ideas and recommendations by individuals in the group; in only two cases, Enterprise and Lewistown, did the groups discuss how to use these ideas to move forward. We suggest that the absence of high-quality agreements, plans, or other forms of agreed-upon actions from Service Trip outcomes may limit self-organization toward ACM. When a process closes prior to reaching agreement, information and outcomes developed during the process are likely to be channeled back into the original hierarchical governance arrangement rather than becoming embedded in new processes developed and agreed upon during the assistance. If information and ideas generated during the intervention end up being ignored, delayed, or altered, no system for accountability will be in place, thereby eroding trust and social capital generated during the process. To effect longer term changes, assisting groups with the development of explicit agreements, both formal and informal, may be critical. This relates to findings by Bonnell and Koontz (2007) regarding the importance of organizational development in forming and maintaining new institutions associated with collaborative watershed management.

In a public lands context, however, where existing regulations and protocols limit the types of agreements that can be made, developing explicit agreements is challenging (Koontz and Bodine 2008). Because NRST members are employees of the USFS and BLM, both multiple use agencies, they are compelled to limit the discussion of options to those feasible within the current regulatory environment. For example, unless specific on-the-ground criteria were met, the elimination of grazing from riparian areas on multiple use public lands was generally not an option considered. This runs contrary to the conditions necessary for authentic dialogue, in which, according to Innes and Booher, "all participants can challenge any assumptions or any assertions. Nothing is taken for granted, and nothing is off the table" (2010:37). This limit to authentic dialogue may have reduced the ability of groups to self-organize; a key feature of adaptive systems.

Overall, our findings suggest that the potential for an outside intervention to catalyze the emergence of ACM arrangements through the facilitation of place-based problem solving may be limited. The facilitation of place-based problem solving, using approaches that reflect adaptive comanagement processes, will not necessarily yield lasting adaptive comanagement arrangements. As such, adaptive comanagement as a process should not be conflated with adaptive comanagement as an outcome; one does not necessarily lead to the other. In addition to working through specific environmental conflicts, improving the lasting capacity of communities to adapt to uncertain environmental threats will require a more targeted approach that builds on existing capacities and expands beyond a specific problem-domain.

CONCLUSION

Using a framework adapted from Plummer and Armitage (2007) and Innes and Booher (1999), we compared the outcomes of the NRST's Service Trips to those forwarded by the ACM literature. The Service Trip model proved to be an effective approach for building relationships of trust, developing shared understanding, and facilitating improvements in natural resource planning. Our findings indicate, however, that the usefulness of such interventions for catalyzing ACM may be limited. Service Trips infrequently influenced the emergence of self-organized governance arrangements characteristic of ACM that are capable of supporting cross-scale networks and ongoing learning.

Our findings highlight the importance of institutional arrangements capable of supporting dynamic learning processes. It is not enough to instigate an intervention reflective of adaptive comanagement processes; for the longer term governance arrangements to be transformed, those processes must become embedded within the community of practice or governance institutions. Many existing institutions are incapable of supporting such processes, thus the need for modifications or the emergence of new governance arrangements.

Outside facilitators such as the NRST will continue to play a pivotal role in assisting communities as they work through periods of change and conflict. Much opportunity exists, however, to improve our understanding of how practitioners can strengthen the adaptability and resilience of public lands social-ecological systems. We suggest that striving to understand linkages between ACM processes and outcomes is one promising line of research that will contribute to this effort.

Responses to this article can be read online at:

<http://www.ecologyandsociety.org/issues/responses.php/5793>

Acknowledgments:

We would like to thank all of the interview participants from the seven cases studies, the staff of the National Riparian Service Team, as well as the U.S. Forest Service Western Wildlands Environmental Threat Assessment Center.

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