Outcome-Based Management and Federal Rangeland Administration: Reframing Adaptive Management on a Complex Institutional Landscape

A Dissertation
Presented in Partial Fulfillment of the Requirements for the
Degree of Doctor of Philosophy
with a
Major in Natural Resources
in the
College of Graduate Studies
University of Idaho
by
Katherine L. Wollstein

Approved by:
Major Professors: Dennis Becker, Ph.D.; Chloe Wardropper, Ph.D.
Committee Members: Michael Overton, Ph.D.; Emily Jane Davis, Ph.D.; April Hulet, Ph.D.
Department Administrator: Kerri Vierling, Ph.D.

May 2022

Abstract

U.S. Western rangelands are inherently dynamic systems where policies are in tension with issues of scale and uncertainty. It is difficult for federal rangeland managers to nimbly respond to real-time conditions, interannual variability, or events such as wildfire. Management challenges such as these span multiple spatial, temporal, and political scales and cannot be overcome by command-and-control approaches. Beginning in 2017, the Bureau of Land Management (BLM) has sought to integrate greater flexibility into federal rangeland management through a series of initiatives that I collectively term "outcome-based rangeland management" (OBM) in this dissertation. In contrast to traditionally prescriptive approaches to rangeland administration, OBM was envisioned to offer a collaborative means for BLM staff and livestock grazing permittees to adaptively respond to place-specific challenges by (1) identifying desired social, economic, and ecological outcomes for grazing allotments, and (2) adaptively managing to achieve desired outcomes.

OBM is an attempt to address the persistent difficulty of crafting governance rules for sustainable resource management while also providing avenues for experimentation, learning, and adaptation to occur. This dissertation considers this theme by examining OBM implementation on Idaho's BLM rangelands and asks: Within a federal policy context, what institutional arrangements can accommodate flexible, adaptive rangeland management approaches? The first article uses comparative case studies of BLM field areas to elucidate how informal and formal institutions interact and create (or eliminate) arenas of discretion for actors to implement outcome-based approaches to address wildfire risk on Idaho's BLM rangelands. The next article uses a co-management framework to examine actors and processes engaged when OBM was first envisioned and offers a perspective on the institutional work necessary if principles of OBM are to be legitimated and, eventually, institutionalized. The final article is conceptual and builds on the two empirical studies by bringing to the fore the scale at which outcome-based processes and adaptive management, more generally, must occur. By focusing on the desired outcome of long-term ecosystem resilience to fire, I propose social and biophysical variables to define the scales for effective outcome-based thinking, planning, and management.

This dissertation has implications for public managers seeking to clarify the boundaries of administrative discretion within the realm of adaptive management. Through an in-depth look at the intersection of institutions and local context, this dissertation explicates the roles of actors and processes working at multiple scales to maintain or modify the institutional landscape to support administrative approaches that better reflect local conditions.

Acknowledgments

I thank Drs. Dennis Becker and Chloe Wardropper for offering me space to explore my interests and develop as a researcher. The trust they showed in me as I designed and executed my research nurtured my confidence as I navigated the dissertation journey. I am also deeply grateful to Dr. Emily Jane Davis for helping me find this path; I thank her for her experience and expertise, generosity, and friendship. Thank you also to Dr. Michael Overton for his enthusiasm for my research and for helping me find my way in new scholarship. I also thank Dr. April Hulet for keeping me thinking about the practical applications and relevance of my work, as well as always having kind words at the ready.

I also thank my Oregon State University colleague and co-author, Dustin Johnson, for his creativity and cheerful persistence as we advanced our ideas. I also acknowledge members of the University of Idaho (UI) Rangeland Center, UI Policy Analysis Group, Boise State University Andrus Center for Public Policy, and Idaho Rangeland Conservation Partnership for their feedback on initial discussions that were the impetus for this dissertation.

This research was supported by a Joint Fire Science Program Graduate Innovation (GRIN) Award (#18-1-01-18), US Dept of Agriculture National Institute of Food and Agriculture McIntire Stennis projects (#1019024 and #1015330), the 2020 UI College of Natural Resources Curt Berklund Graduate Research Scholar Award, and a UI Office of Research and Economic Development Research Infrastructure and Scholarly Excellence (RISE) Graduate Research Fellowship.

Lastly, I sincerely thank the 112 participants who welcomed me into their homes, offices, local haunts, pickup trucks, backyards, and barns during the course of this research.

Dedication

To my family and friends for their unflagging support, especially that of my parents, Bruce and Barbara Wollstein, as well as Emily Jane Davis and Jenna Mackay. To my labmates, Maddie Goebel and Courtney Cooper, for their camaraderie and humor. To Catrin Edgeley and Chelsea Pennick, my resolute and dedicated writing group. Lastly, to Andrew Donaldson for the confidence he's shown in me, fiercely repeating, "You're going to get this done." It's done!

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List of Abbreviations

AUM	Animal Unit Month Management
BLM	Bureau of Land Management
DOI	Department of Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESR	Emergency Stabilization and Rehabilitation
FLPMA	Federal Land Policy and Management Act
IM	Instruction memorandum
IRCP	Idaho Rangeland Conservation Partnership
IWJV	Intermountain West Joint Venture
LUP	Land Use Plan
NEPA	National Environmental Policy Act
NGO	Nongovernmental organization
OBGA	Outcome Based Grazing Authorization
OBM	Outcome-based rangeland management
OWEB	Oregon Watershed Enhancement Board
PAG	Policy Analysis Group
RFPA	Rangeland Fire Protection Association
RMP	Resource Management Plan
RMS	Rangeland Management Specialist
SRM	Society for Range Management
UI	University of Idaho
SageCon	Sage Grouse Conservation Partnership
USDA	United States Department of Agriculture

Statement of Contribution

Drs. Dennis Becker and Chloe Wardropper were involved in the overall concept and research design of Chapters 2 and 3 and assisted with securing funding for data collection. They also provided detailed editing. Dr. Emily Jane Davis provided conceptual and methodological feedback on Chapters 3 and 4. Dustin Johnson, with Oregon State University, significantly contributed to the concept and design of Chapter 4.

Chapter 1: Introduction

Introduction

U.S. Western rangelands are inherently dynamic systems where issues of scale and uncertainty make it difficult for managers to nimbly respond to real-time conditions, interannual variability, or events such as wildfire (Folke et al., 2007; Cumming et al., 2006). Management challenges such as these span multiple spatial, temporal, and political scales and cannot be overcome by command-and-control approaches. There is an evident need for greater flexibility within U.S. rangeland administration so resource managers may respond within ecologically- and socially-relevant timeframes to localized challenges (Hruska et al., 2017). What are the characteristics of institutional arrangements that can accommodate flexible, adaptive rangeland management approaches within a federal policy context? What is the relative importance of formal and informal institutions in these arrangements? What are actors' roles in maintaining or creating necessary institutions? At what scale(s) does or should this work occur? These questions underpin this dissertation; I situate them within the broader context of decentralization in environmental governance by analyzing a recent Idaho initiative called outcome-based rangeland management (OBM; see Table 1.1 for definitions of key terms and concepts).

Background

Rangeland administration has been largely shaped by institutional legacies from historical social, political, economic, and ecological dynamics (Sayre, 2017). Following the Cattle Boom, overgrazing, and widespread resource degradation in the late 19th century, the lands of the arid and semi-arid West began to be managed with the notion that rangelands have a determinable carrying capacity and parameters for their use must be codified (Briske et al., 2011; Wilson, 2014). This was evidenced in 1934 by the Taylor Grazing Act (TGA), which designated grazing districts and specified stocking rates on public rangelands through a system permitting. By regulating occupancy and use of grazing lands, the TGA was intended "…to preserve the land and its resources from destruction or unnecessary injury, to provide for the orderly use, improvement, and development of the range" (43 U.S.C.A. § 315(a) 1934).

Today, the Bureau of Land Management (BLM) issues nearly 1,900 livestock grazing permits on 12 million acres in Idaho (BLM, 2022). In service of the BLM's multiple use and sustained yield mandate stipulated by the 1976 Federal Lands Policy and Management Act, these permits specify terms and conditions such as when and how intensively livestock may graze. Generally, such permits

may be renewed every ten years if the BLM determines that the terms and conditions were met by the permittee.

The TGA's system of permitting for public rangelands was meant to address a collective action problem that transpired on the open range where there had previously been few or no rules for resource use (see Hardin, 1968). Other federal policies that apply to rangelands also rely on unrealistic assumptions of ecosystem stationarity, emphasizing predictability in management outcomes (Rissman and Wardropper, 2021). An unintended consequence of such policies has been difficulty for today's managers in nimbly responding to the realities of a dynamic natural system and adapting their actions as learning occurs (Allen et al., 2017).

Most permits contain few or no mechanisms for accommodating annual variation (e.g., in forage production or fuel loads) or stochastic events such as drought and wildfire. As a result, rangeland managers have few administrative options to adjust the terms and conditions of a permit to respond to a wildfire event or to address an emergent issue, such as an exotic annual grass infestation, in a way that might enhance ecological condition, reduce likelihood of wildfire, or minimize financial loss. This highlights a fundamental tension in rangeland governance: in a complex and dynamic system, it is difficult to develop policies and rules that sustainably govern resources while also offering avenues for experimentation, learning, and adaptation to occur (Reiners, 2012; Fischman and Ruhl, 2016).

Beyond the limitations of policies derived from institutional legacies and unable to accommodate uncertainty, public resource managers are also incentivized to adhere to their organization's established rules and norms because they provide predictable outputs and reduce potential legal or social repercussions (e.g., Feiock, 2013). Institutional arrangements—the configurations of formal rules as well as their interpretation and practice (termed "rules-in-use")—function to stabilize interactions between individuals and groups by creating the parameters for accepted behaviors whenever managers find they have discretion (Christiansen and Neuhold, 2012). Rules-in-use are thus products of sociocultural processes such as leadership, experience, and workplace culture (Schlager and Cox, 2018). Taken together, it is a combination of laws and policies as well as the interpretations of laws and policies through a sociocultural lens that structure human actions—including on-the-ground policy implementation.

Dissertation Context and Rationale

Context

Driven by a desire for greater flexibility in public rangeland management, "outcome-based rangeland management" (OBM) emerged in 2017 from conversations among rangeland leaders and key stakeholders in Idaho. Proponents of OBM sought to collaboratively identify desired social, economic, and ecological outcomes for a management unit or community and use grazing management to reach those outcomes (IRCP, 2019). Outcome-based approaches use tactics such as livestock turnout dates in response to current rangeland condition (i.e., plant phenology) and forage availability, rather than solely the calendar dates stipulated on a permit. OBM was thus envisioned to better use livestock grazing timing and duration to promote sustainable rangeland management.

In early 2018, the BLM announced the selection of 11 Outcome-Based Grazing Authorization (OBGA) demonstrations in six western states. In contrast to historically prescriptive grazing permit administration, the OBGAs were promoted as a collaborative way for BLM staff and permittees to address place-specific challenges by identifying desired outcomes for a grazing allotment and the management activities to achieve them. For example, an OBGA may include terms and conditions that authorize the permittee to utilize more forage in an above-average production growing season to reach the mutually-agreed-upon goal of reducing fuel loads and wildfire risk later in the year. In fall of 2018, the BLM's national office also issued guidance in an Instruction Memorandum (IM 2018-109; Appendix A) on optionally integrating greater "flexibility in grazing management" and other OBM principles into grazing permits.

The intent of OBM—articulated by both rangeland leaders in Idaho and the BLM—is to promote desired outcomes on public rangelands while offering local actors discretion to determine how to achieve them. However, OBM remained fairly informal through the duration of my research. I thus use "OBM" throughout this dissertation as a collective term to refer to two or more actors working together to achieve desired outcomes on BLM grazing allotments. I consider it as a variation of adaptive management: although OBM emphasizes stakeholder participation and iterative decision making, it lacks formal processes for implementation, learning, and evaluation that characterize other modes of adaptive management (e.g., adaptive co-management; see Berkes, 2009).

Rationale

OBM and other practices that depart from traditional approaches to rangeland administration are examples of innovation in public land management. Innovations are new, intentional activities or ways of thinking that involve developing or deploying ideas that challenge conventional wisdom and disrupt or improve habituated practices (Steelman 2010). OBM may involve integrating permittee

knowledge and then changing practices that have not historically achieved desired outcomes, increasing interactions between the BLM and permittees to monitor effects of changed practices, or engaging new rangeland stakeholders to identify outcomes for an allotment. Additionally, the deviation of OBM from traditionally centralized modes of grazing administration offers an opportunity to scrutinize institutional design and implementation. It is useful to study innovations and emergent arrangements because examination of institutional configurations can be instructive in understanding actors, their roles, and other variables in the effectiveness and limitations of models (Agrawal, 2001).

This dissertation contributes further evidence of the importance of local context for implementing new policies or practices. The specific theoretical contributions are first that local norms, culture, and experiences of an office or field area open or eliminate opportunities for experimentation, learning, adaptation to occur. Second, a few savvy individuals can make or break new initiatives; their actions can clarify boundaries of new practices, share know-how, generate legitimacy, and produce new institutions. Yet, if they do not believe that the practice or process is legitimate at its onset, legitimation and eventual institutionalization will be limited. Lastly, the desired outcome ought to inform the scale at which outcome-based planning is undertaken. Scale, actors, and processes must be intentionally engaged on a fairly crowded institutional landscape where issues encompass multiple scale mismatches.

Recent shifts in environmental governance add to a broader debate on the changing roles of governmental and nongovernmental actors in addressing intractable, multi-scalar challenges such as larger and more frequent wildfires on northern Great Basin rangelands (Lemos and Agrawal, 2006; Berkes, 2010; Reed and Bruyneel, 2010; Pierre, 2012). This dissertation thus benefitted from a policy window; OBM was relatively new and unfolding over the course of data collection (2017 through 2020) and potentially offered new roles for nongovernmental actors in grazing permitting, a traditionally government-led process. By focusing on the formulation of OBM principles and initial implementation efforts, I examined the early roles of institutions in enabling or limiting OBM, the institutional work and learning that has been done or will need to be done to legitimate new institutional arrangements to support OBM, and the scale at which actors and processes must operate to overcome persistent collective action problems.

Dissertation Organization

This dissertation contains three manuscripts (Table 1.2) and a conclusion. Across the three manuscripts, I investigate the institutions, actors and capacities, practices which might lead to institutional innovation, and scales for adaptive rangeland management in support of desired social,

economic, and ecological outcomes. Because OBM was taking shape in real-time and there have been no prior studies on implementing OBM, the empirical chapters of this dissertation were largely exploratory and used a combination of document analysis, in-depth interviews, comparative case studies, and qualitative induction to address research objectives and triangulate findings (Maxwell 1996). Research protocols were approved by the University of Idaho's Institutional Review Board for compliance with human subjects research requirements (protocol #17-232; Appendix B).

The first manuscript considers implementation of outcome-based approaches by BLM field office staff and grazing permittees in three BLM field areas. I examine the contextual conditions created by the interaction of formal and informal institutions in whether and how local-level actors perceive avenues within existing policies for implementing outcome-based approaches. The next manuscript considers the aims of OBM more broadly, from its inception in 2017 to the conclusion of my data collection in 2020. I use a co-management framework to examine actors and processes engaged when higher-levels first envisioned OBM, and offers a perspective on the institutional work necessary if OBM is to be legitimated and, eventually, institutionalized. The final manuscript is conceptual and builds on the two empirical chapters by bringing to the fore questions of the scale at which outcome-based processes and adaptive management, more generally, must occur. By focusing on the desired outcome of long-term ecosystem resilience to fire, I conceptualize the spatial, temporal, and jurisdictional scales for effective OBM thinking, planning, and implementation. Below, I provide brief overviews and highlights from each chapter.

Chapter 2

People's actions are directed and constrained by institutions, that is, rules, norms, and social interactions, as well as by the biophysical world (Schlager and Cox, 2018). For this reason, decisions guided by formal policies may lead to different implementation from place to place—even when executed by individuals from the same agency. In the first manuscript (Chapter 2), I apply elements of institutional theory to policy implementation by elucidating the relative roles of institutions in actors' undertaking adaptive management approaches such as OBM. Through comparative case studies comprised of 70 semi-structured interviews with permittees, BLM staff, and other agency and nongovernmental stakeholders in three Idaho BLM field areas, I examine how informal and formal institutions interact and create (or eliminate) arenas of discretion for implementing outcome-based approaches to address wildfire risk on Idaho's BLM rangelands.

<u>Highlights</u>

- Informal and formal institutions, in addition to resource condition within field areas, are mutually reinforcing and, together, create perceptions of barriers or avenues for OBM implementation within BLM field areas.
- Differences in the informal institutions among field areas have a large role in participants' different interpretations of latitude found within formal institutions ("gray zones"). Among the case studies, this is evidenced by the different uses of administrative tools to create or limit flexibility within field offices.
- Relatively important institutions in whether participants use gray zones are related to BLM-permittee relationships, staff experience (e.g., history with litigated grazing decisions), beliefs about the efficacies of grazing to manage fire risk, and field office leadership.
- This research underlines the role of informal institutions in creating or reducing the discretion local-level actors perceive they have within federal policy contexts.

Chapter 3

Co-management and other decentralized natural resource governance models incrementally develop over time with new policy initiatives. When institutions must be created or modified to support these arrangements, some local-level implementers engage in learning and negotiation through networks linkages. This institutional work may legitimize actions under new arrangements and, ultimately, institutionalize new policies or practices. The second manuscript (Chapter 3) examines the conception and early implementation of OBM in Idaho as a fledgling co-management arrangement in which the BLM shares decision-making authority with resource users (i.e., permittees). I trace features of co-management in the OBM effort through participant observation, 27 exploratory interviews with key-informants, 32 in-depth interviews with BLM staff, and analysis of relevant documents and media. I focus on the learning that occurred or will need to occur to legitimate OBM and lead to the creation of new structures to support broadscale implementation (i.e., institutionalization).

<u>Highlights</u>

- A lack of formal guidance on OBM implementation limits initial perceptions of legitimacy and uptake at operational levels
- Some savvy BLM field office staff are implementing elements of OBM and seek to legitimize their actions through approval from higher levels of the BLM or through successfully defending them in court.
- Collective choice levels have a large role in facilitating knowledge-sharing from these instances through horizontal linkages (i.e., between field offices).
- Without the development of formal institutions alongside localized instances of OBM implementation and know-how shared through horizontal networks, legitimation of OBM and eventual institutionalization will be limited.

Chapter 4

It is difficult for individuals, communities, and organizations to engage in collective actions across jurisdictions and at a scale that will effectively address the drivers of frequent rangeland wildfires in the northern Great Basin. The final manuscript (Chapter 4) considers the complex issue of the scales at which actors and processes must operate to achieve a shared vision of rangeland resilience and secure desired ecological, social, and economic outcomes. This conceptual chapter enumerates multiple scale mismatches and the institutional arrangements in rangeland and fire management that perpetuate them. Drawing on principles of Community-Based Natural Resource Management and examples from southeastern Oregon, I propose social and biophysical variables to advance an applied concept for integrating rangeland and fire planning and management at a scale that is relevant for managing large-scale wildfires and supporting the desired outcome of long-term ecosystem resilience.

Highlights

- Challenges related to rangeland wildfire management stem from governance institutions that cannot accommodate uncertainty inherent in rangeland systems, differences in objectives between rangeland and fire management institutions (despite the interrelated nature of the issues), and planning and implementation processes that do not necessarily occur at appropriate scales.
- Integrating rangeland and fire planning and management will be essential for overcoming scale mismatches and collective action problems. This requires developing adaptive institutions and coordinating activities among multiple jurisdictions and actors.
- I make a case for fireshed-scale coordination via Fireshed Councils, a unit that has both biophysical and social relevance to individuals and organizations engaged in fire risk mitigation.
- Operating in a collective arrangement at a fireshed-scale aims to ensure that an individual or organization's activities transcend traditional modes of planning (i.e., parcel-scale), complement concurrent management activities, and translate to long-term ecosystem resilience to fire.

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Tables

Table 1.1. Definitions of key terms and concepts in this dissertation.

Term/Concept	Definition
Actors	Governance participants; individuals, organizations, or groups
Co-management	Power- or responsibility-sharing arrangement between government and local resource users (Berkes, 2009); a mode of decentralized and devolved governance.
Collective action problem	Occurs when rewards for pursuing individual self-interest are greater than those accrued through joint action for a common good. May be averted when interdependent actors cooperate and coordinate their actions (Olson, 1965).
Institution	Formal and informal rules that structure social interactions. Formal institutions are written rules; informal institutions are implicitly understood norms and expectations for interactions (Ostrom 1990; Christiansen and Neuhold, 2012).
Institutional arrangement	Context for human action (i.e., action situation) created by formal and informal institutions and biophysical conditions (Ostrom, 2005; Schlager and Cox, 2018). A tool for aligning diverging individual and collective interests.
Institutional work	Individuals exercising agency within existing institutional structures to maintain, modify, or build institutions (Lawrence and Suddaby, 2006)
Institutionalization	When changes or new practices become embedded in existing institutional structures and are reproduced over time (Moseley and Charnley, 2014)
Legitimation	The process through which a practice becomes acceptable in the context of social norms and values (Bitektine and Haack 2015)
Outcome-based rangeland management	Adaptive management approach in which two or more actors work to achieve desired social, ecological, economic outcomes on a discrete rangeland unit (e.g., allotment or ranch-scale)
Scale	Social construct used to organize understandings of relationships and interactions (Cash et al., 2006). For this dissertation, I refer to scale as any specific spatial or temporal unit that contains the phenomenon of interest.
Scale mismatch	Arise when institutions do not fit the scales of the resource challenge they're meant to address (Cash and Moser 2000). May result in loss of ecosystem function or low adaptive capacity.

Table 1.2. Summary of dissertation chapters, questions addressed, theoretical areas engaged, and manuscript deliverables.

Chapter title	**Questions addressed**	**Theoretical areas**	**Manuscript**
Outcome-Based Approaches for Managing Wildfire Risk: Institutional Interactions and Implementation Within the "Gray Zone"	How do formal and informal institutions interact to affect the use of outcome-based approaches to manage wildfire risk on rangelands?	Institutional theory; policy implementation	Wollstein et al., 2021 in *Rangeland Ecology and Management*
The Institutional work of Learning and Legitimation: Lessons from a Fledgling Co-management Arrangement	What are the benefits and limitations of a less formal co-management arrangement in early implementation? What institutional work legitimates such arrangements?	Co-management; institutional work	Wollstein et al.; to be submitted to *Environmental Management*
Integrating Rangeland Fire Planning and Management: The Scale, Actors, and Processes	What is the scale for effective outcome-based planning and implementation? How can institutional objectives and actors' authorities be aligned to overcome collective action problems associated with managing rangeland wildfire?	Community-Based Natural Resource Management; collective action	Wollstein & Johnson; under review for special issue of *Rangeland Ecology and Management*

Chapter 2: Outcome-Based Approaches for Managing Wildfire Risk: Institutional Interactions and Implementation Within the "Gray Zone"

Published in: Wollstein, K., Wardropper, C.B., Becker, D.R., 2021. Outcome-Based Approaches for Managing Wildfire Risk: Institutional Interactions and Implementation Within the "Gray Zone." Rangeland Ecology & Management 77, 101-111.

Abstract

In the United States, the Bureau of Land Management (BLM) manages rangeland resources under dynamic conditions such as drought, annual grass invasion, and larger and more frequent wildfires. But federal policies governing rangelands are not structured to respond to annual variability or unexpected events. To integrate flexibility into public rangeland administration and potentially leverage fuels management treatments at the landscape scale, the BLM and livestock grazing permittees are exploring outcome-based rangeland management approaches to achieve desired ecological, social and economic conditions. This paper examines administrative policies and barriers to using outcome-based approaches to manage fire risk in Idaho through 70 semi-structured interviews with permittees, BLM staff, and other agency and nongovernmental stakeholders in three Idaho BLM field areas. We analyzed how rules and norms in policy implementation contributed to perceptions of barriers within and among different field areas. Factors affecting perceptions of outcome-based rangeland management implementation included BLM staff tenure, permittee-agency relationships, beliefs about the efficacy of grazing to manage fire risk, and leadership and staff experience in navigating National Environmental Policy Act requirements or potential lawsuits. Differences in the informal institutions among field areas led to different interpretations of latitude found within formal institutions ("gray zones") for implementation. This study highlights the importance of local context and the interactions between administrative policies and agency culture for implementing adaptive approaches to managing wildfire risk on public rangelands.

Introduction

Climate change, changing land uses, and invasion of exotic annual grasses contribute to larger, hotter, and more frequent fires on US western rangelands (Abatzoglou and Kolden, 2011; Balch et al., 2013; Coates et al., 2016). But due to the extensiveness and mixed-ownership of these lands, disparate fuel management treatments such as prescribed burning or herbicide spraying are singularly inadequate for influencing fire behavior at the landscape scale (Davies et al., 2015a). With

livestock grazing authorized on 155 million acres of Bureau of Land Management (BLM) lands in the West, strategic application of grazing is a relatively widespread but currently underused tool for reducing fuel loads and leveraging existing fire risk management activities (Diamond et al., 2009; Strand et al., 2014; Davies et al., 2015b).

In federal land management, a combination of policies, local culture and norms, and beliefs of managers and users can create barriers to widespread use of fuels management tools such as grazing (e.g., Moseley and Charnley, 2014; Schultz et al., 2019). Land managers and resource users alike make decisions in situations structured by biophysical conditions and institutions (i.e., rules and norms governing the management of those resources; Schlager and Cox, 2018). Institutions guide, constrain, and direct people's interactions and actions. Formal institutions are codified in policies and regulations that are legally enforceable. For example, livestock grazing on public rangelands is statutorily required to be administered through grazing permits, which include terms and conditions such as when and how intensively ranchers (permittees, hereafter) may graze livestock. In contrast, informal institutions are products of cultural norms and social interactions that take the form of shared expectations among participants (Christiansen and Neuhold, 2012). Implicitly understood by resource managers and users, informal institutions are usually not written down or enforced inside traditional legal channels (Schlager and Cox, 2018).

Informal institutions interact with formal institutions by complementing, filling gaps, and operating within "gray zones" (i.e., areas within formal rules that include avenues for interpretation) (Landsbergen and Orosz, 1996; Christiansen and Neuhold, 2012). For example, the notion of "range readiness" refers to plant phenology and other environmental conditions and governs livestock turnout dates for grazing on BLM allotments. Range readiness is a condition referenced in planning documents like BLM Resource Management Plans. But how range readiness is actually practiced is a function of managers' experiences and discretion, not a strict date of use. For this reason, decisions guided by laws and regulations may lead to different implementation from place to place, even when executed by individuals from the same agency (Hruska et al., 2017).

Using three case studies of BLM field areas in Idaho, we examine how formal and informal institutions interact and affect the use of outcome-based approaches to manage fire risk on rangelands. Outcome-based rangeland management (OBM) is a recent BLM initiative to adaptively respond to annual variability on rangelands permitted for livestock grazing. For the purposes of this research, we situate OBM within recent trends in adaptive management approaches on public lands. Although much has been written about adaptive management, this study brings an institutional lens to bear on adaptive approaches to rangeland management to understand arenas for implementation within the

sideboards of federal policies. The specific objectives of this study were to: (1) understand permittees' and local-level BLM administrators' perceptions of barriers to OBM implementation, and (2) elucidate how differences in informal institutions among field areas contribute to perceptions of barriers to OBM implementation.

Literature Review

Although the BLM and other state and federal land management agencies undertake prescribed burning, mastication, spraying herbicides, and other activities to manage rangeland fire risk, some have critiqued such activities as inadequately coordinated or synergistic to influence fire behavior at the landscape-scale (Diamond et al., 2012; Davies et al., 2015a). There is abundant research examining fuel characteristics, fire ignition, and fire frequency in rangeland ecosystems (e.g., Diamond et al., 2009, 2012; Davies et al., 2015a, 2015b, 2017). However, the policies and social factors involved in broad-scale application of such strategies for managing fire risk remain a relatively neglected area of research in rangeland management. Recent research has considered policy barriers for prescribed fire application on BLM and US Forest Service lands (Schultz et al. 2019), but this work does not address opportunities to leverage fuels management efforts in systems where livestock grazing is the predominant land use. As follows, we consider the limits of adaptive approaches to rangeland management within the US federal policy context.

Public rangeland management in the United States takes place within a nested institutional context, wherein federal policies attempt to balance accountable resource management with the realities of environmental variability (Reiners, 2012). But mechanisms for learning and adaptation are needed for managing dynamic rangeland systems (Boyd and Svejcar, 2009). Adaptive management, an approach used by many natural resource agencies, is an iterative process of structured decision making in which management options are implemented, outcomes assessed, and management strategies are adjusted as learning occurs (Allen and Gunderson, 2011). This process can be facilitated through clear objectives and processes that allow flexibility to revisit and learn from past management decisions. Walters (1986) provided an early description of adaptive environmental management as ongoing management activities that serve as experiments, can reduce uncertainties, and facilitate learning. More recently, the notion of adaptive co-management or collaborative adaptive management has expanded on this approach, emphasizing participatory multistakeholder processes and structured, deliberative learning that must occur to achieve desired social and environmental outcomes (e.g., Wilmer et al., 2018; Fernández-Giménez et al., 2019). For the purposes of this research, we conceptualize outcome-based rangeland management—a relatively new effort—as an adaptive management approach that emphasizes stakeholder participation and iterative decision making but is

distinct from collaborative adaptive management in its lack of formal processes for implementation, learning, and evaluation.

Some scholars posit that rangeland systems are particularly well suited for adaptive management because both uncertainty and controllability are high. System dynamics can be modeled (e.g., state-and-transition models); there are discrete, spatially delineated management units (i.e., pastures and allotments); uncertainties related to management impacts are analyzed when administrators authorize resource uses; and management objectives are often specified (e.g., in BLM Resource Management Plans; Allen and Gunderson, 2011; Allen et al., 2011; Allen et al., 2017). However, existing policies and associated administrative structures often require management activities to produce relatively certain outcomes, even in systems where environmental variability is high (Schultz, 2008). In the social-ecological systems literature, adaptive management design and implementation are hindered when laws and policies 1) fail to account for the dynamic nature of social-ecological systems; 2) rely on the ability to predict all the environmental and social outcomes of an activity; or 3) default to linear, rather than iterative, decision-making processes (Frohlich et al., 2018). Policies and formal institutions can constrain flexibility and institutional support for adaptive approaches (Benson and Stone, 2013). For instance, the National Environmental Policy Act (NEPA) requires review of environmental impacts via environmental assessments or the more extensive environmental impact statements, analysis of proposed actions, and mitigation plans before undertaking federal projects (e.g., erecting a new fence or constructing fuel breaks on federal land). However, NEPA processes require relative certainty of outcomes (identified in the analysis of proposed actions), and judicial review of agency actions or the outcomes of the activity can make implementation difficult because agency staff are often preoccupied with avoiding legal disputes (Schultz, 2008; Craig and Ruhl, 2014; Fischman and Ruhl, 2016). These aspects of NEPA may encourage management approaches that prioritize avoidance of potential lawsuits rather than experimentation and learning (Bjorkland, 2013).

Although policy is pivotal in the development and performance of institutions, learning processes that accompany adaptive natural resource management are contextual and "… exist in relation to the place in which they occur, the experiences from which they arise, and the cultures with which they are associated" (Keen and Mahanty, 2006, p. 498). That is, informal institutions are the lens through which policies and other formal institutions are interpreted and implemented (Christiansen and Neuhold, 2012). For example, political, legal, and cultural factors have been found to be central in BLM and US Forest Service agency personnel's perceptions of barriers to implementing ecosystem management (a tenet of which is adaptive management); cultural barriers

are related to willingness of agency personnel to innovate and experiment and attitudes and beliefs about resource use (Koontz and Bodine, 2008). Informal institutions, created and reinforced by these aspects of culture, operate by complementing or filling gaps in formal institutions (Christiansen and Neuhold, 2012).

Given that combinations of formal and informal institutions can create perceptions of barriers to agency implementation of some policies, we must next ask: What institutional arrangements enhance flexibility and allow adaptive, experimental approaches to be implemented? Landsbergen and Orosz (1996) define "gray zones" as spaces in which laws are silent or ambiguous and agency interpretations and expectations can establish acceptable practices within the sideboards of legislative rules. For example, the Federal Land Policy and Management Act (FLPMA) is a legislative rule and requires the BLM to develop Resource Management Plans (RMPs) to describe how the agency will manage resources within a field area to meet the agency's objectives. But FLPMA provides only general guidelines for developing RMPs. In practice, RMPs are administrative tools whose contents reflect what field managers and resource specialists view as important for the field area. As administrative tools, RMPs are formal institutions but are also products of informal institutions (i.e., agency experience, culture, local politics, and the values of the public involved in creating the plan). It is these interactions of formal and informal institutions that "give shape" to the gray zone (Landsbergen and Orosz 1996). In order to understand why an adaptive approach is embraced—or not—by a BLM field office, we must consider the interactions of formal and informal institutions and where subsequent gray zones are perceived for agency implementation of OBM.

Methods

Study Context

Livestock grazing on BLM rangelands is administered by staff in field offices and authorized through grazing permits, which include legal terms and conditions such as class, timing, and duration of livestock grazing. Because terms and conditions are reviewed every 10 yr, they typically do not allow for much interim flexibility for responding to unexpected conditions such as drought, above-average forage production, or wildfires. Desired changes require analyses of proposed actions per NEPA, which is often time consuming and expensive (Bjorkland, 2013). As a result, adaptive responses to dynamic conditions are difficult for agency managers to authorize or implement within the 10-yr lease period.

The BLM has recently been exploring approaches to better respond to variability on public rangelands. In 2018, the agency began piloting outcome-based grazing authorizations (OBGAs) with 11 ranches in six western states. In addition, the BLM issued an instruction memorandum (IM)

providing guidance on outcome-based grazing and "flexibility in grazing management" to be optionally implemented outside of the formal pilots by BLM districts (IM 2018-109). For our purposes, we consider the OBGA pilots and other outcome-based approaches described by the IM under the collective term "outcome-based management" (OBM). The goals of OBM are to 1) decrease response time to real-time resource conditions and 2) achieve desired ecological, social, and economic conditions for both the BLM and permittees (BLM, 2017).

OBM may use options such as livestock turnout dates in response to current rangeland condition such as plant phenology and forage availability, rather than solely the calendar date stipulated on a permit. In Idaho, for example, outcome-based approaches may be useful for addressing annual grass invasion (e.g., cheatgrass [*Bromus tectorum* L.] and medusahead [*Taeniatherum caput-medusae* [L.] Nevski]), which exacerbates fire risk and condenses natural fire return intervals in formerly sagebrush-dominated communities (Balch et al., 2013; Coates et al., 2016). A BLM manager and a permittee may identify the mutually agreed-upon goal of reducing fire risk, increasing native perennial abundance, or improving wildlife habitat. An outcome-based approach may authorize the permittee to graze invasive annual grasses in early spring before perennial emergence to reduce competition between annuals and more fire-resistant native species.

Study Areas

In Idaho, the BLM administers nearly 1,900 livestock grazing permits covering 12 million acres of public rangelands (BLM, 2020b). Although the OBGA pilots and guidance on OBM emerged from the national BLM office, we selected our cases from Idaho because early conversations in developing this research indicated that much of the momentum and ideas were driven by BLM leadership within Idaho. Idaho's rangelands are also a hotspot for fire risk, particularly in the Boise, Idaho Falls, and Twin Falls BLM Districts from which cases were selected (Table 2.1). In recent decades, fires have become larger and more frequent in these areas due to climate change, changing land uses and increased ignition sources, and proliferation of exotic annual grasses (Abatzoglou and Kolden, 2011; Balch et al., 2013). Each year in Idaho, the BLM responds to an average of 330 human and naturally caused fires that burn about 270,000 acres of public and private lands. The agency undertakes mechanical thinning; prescribed burning; and chemical treatments to manage fuels, seedings, and postfire rehabilitation; and creation of fuel breaks to enhance fire suppression efforts (BLM, 2020a). But in some annual grass-dominated areas, fire return intervals may be as short as 3−5 yr, allowing invasive annuals to outcompete slower-growing native perennial grasses and shrubs after a fire (Coates et al., 2016).

In 2018, we conducted exploratory interviews with 22 key informants in six BLM field offices in Idaho to inventory existing understandings of OBM and identify challenges unique to each locale. Initial key informants included permittees, state and federal resource management agencies, and nongovernmental organizations who were identified by University of Idaho Extension faculty and staff in the Idaho State BLM Office; subsequent participants were recruited via snowball sampling (Lewis-Beck et al., 2004). Findings from these interviews were synthesized into memorandums by the lead author and used to develop case study profiles. These syntheses informed our subsequent holistic multiple-case design, in which three cases were selected from 10 BLM field areas, with one case from each of the three BLM districts with rangelands in Idaho (Figure 2.1).

BLM field offices administer grazing permits within the field area and represent the local level of implementation, wherein BLM staff work directly with permittees and other agencies and organizations associated with resource management on BLM lands. Field offices receive guidance from district offices, which are all overseen by the state BLM office. Due to the sensitive nature of findings and relatively small sample sizes of BLM staff within field offices, we have anonymized the cases and refer to them as field areas A, B, and C. In our study, comparative case studies allow for contrasting institutional conditions in each field area; cases were selected for yielding theoretical contrast (Yin, 2014). Field area A is considered to contain relatively healthy rangelands and has experienced considerably fewer catastrophic fires in the past 20 yr compared with field areas B and C. In addition, one of the field areas includes a formal OBGA pilot. Other factors such as prevalence of litigation related to rangeland management decisions in the field areas, social and political context, and staff turnover also provided theoretical contrast among the selected cases. Although case studies are not statistically generalizable, in-depth understanding gained can clarify the relation of a particular set of results to broader theory and determine if alternative explanations may be more relevant (Yin, 2014).

Data Collection

Given that the BLM's interest in outcome-based approaches is relatively new and because there have been no prior studies on implementing OBM, our study design was exploratory and used multiple types of data. We used a combination of document analysis, in-depth interviews, and qualitative induction to address research objectives and triangulate findings (Maxwell, 1996). Due to the politically sensitive nature of the subject matter (e.g., asking BLM staff to describe sometimes difficult interactions with rangeland users, ongoing lawsuits regarding grazing permits), we determined that other data collection methods such as focus groups or surveys would not yield the

depth, detail, and nuance necessary to explore how and why some BLM staff perceive barriers to implementing OBM.

Data collection activities took place in summer and fall of 2019 and consisted of 70 in-depth, semi-structured interviews with BLM staff in field offices, as well as with permittees and other relevant agencies (e.g., Idaho Department of Fish and Game) and nongovernmental actors (NGO) within the respective field areas (Table 2.2). BLM participants were purposively sampled for their involvement in grazing permit administration; most staff were rangeland management specialists, fuels managers, or other resource specialists. Permittee, agency, and NGO interviewees were accessed through personal references from BLM staff and sampled via snowball in the field areas. Three individuals had participated in the 2018 exploratory interviews and were again interviewed in 2019. We ceased interviewing when theoretical saturation was reached in each case, wherein no new information was learned from subsequent interviews (Lewis-Beck et al., 2004).

An interview guide was developed using memorandums produced after the 2018 exploratory interviews. For this study, interviews were semi-structured, lasted between 60 and 120 min, and were audio recorded with permission of participants. Permission was not granted in five instances, and handwritten notes were taken instead. Interviews were conversational and first sought to identify management activities participants believed would achieve the desired outcome of reduced fire risk on BLM allotments on which they held grazing permits (permittees), managed (BLM staff), or conducted other activities (interviewees from other agencies and organizations). Follow-up questions were used to understand participants' perspectives on whether they believed the desired activities they cited are allowable under current rules and regulations. When appropriate, the interviewer probed using context-specific questions about rules configurations to discover whether perceived barriers to implementation were derived directly from policy (formal institutions) or rules-in-use, local norms, and culture (informal institutions). Questions for BLM staff focused on day-to-day permit administration such as how to allocate and manage BLM resources (e.g., staff time), provide information within offices and to permittees, monitor actions, and enforce rules. The interviewer also read verbatim to participants from the 2018 BLM Instruction Memorandum entitled "Flexibility in Livestock Grazing Management" to query how individual participants interpret (or experience, in the cases of permittee interviews) formal protocols or see difficulties in implementing outcome-based approaches for managing fire risk.

Documents collected to provide context and supplement interviews included environmental assessments (EAs) and environmental impact statement documentation from the BLM's National NEPA Register (eplanning.blm.gov) 2005 to 2020 for permit renewals, noxious weed and invasive

plant management, vegetation treatments, fuel breaks, and resource management plans for each field area. We also examined BLM manuals for range and fire program management and grazing regulations in the Code of Federal Regulations. These documents were used to validate data collected from interviews (Maxwell, 1996), particularly regarding the legal and administrative context of the past 15 yr.

Data Analysis

We used NVivo qualitative analysis software and an iterative approach to identify and characterize the barriers to implementing outcome-based approaches for managing fire risk perceived by permittees and BLM staff. Our analysis focused on categorizing perceptions of barriers to the implementation of OBM into formal and informal institutions. After identifying relatively important formal and informal components in perceptions of barriers to OBM based on frequency of references by participants, initial findings were discussed among authors and confirmed separately with key informants via telephone. The lead author then conducted focused coding to accumulate evidence that added to or undermined our initial understandings of relevant institutional components in creating perceptions of barriers. Focused coding also separated permittee and BLM staff perceptions to elucidate if there were shared or divergent perceptions of barriers among categories of actors. Finally, we compared findings across cases, seeking to identify differences in how participants in each case perceived barriers to generate new understandings about the roles of informal institutions in OBM for managing fire risk.

Results

Desired fire risk management activities identified by participants were largely focused on those related to management of fuels (both accumulated native perennial grasses and invasive annual grasses) and fire response, such as construction of fuel breaks to enhance firefighters' responses during incidents (Table 2.3). Through qualitative analysis, factors creating barriers to OBM most frequently referenced by participants were grouped into policies and formal processes, culture and norms, and experience and history within the field area (Table 2.4).

Frequently referenced formal institutions creating barriers to implementing outcome-based approaches were meeting NEPA requirements and BLM Idaho Standards for Rangeland Health. We additionally found that informal institutions created by participants' beliefs about resource management, leadership, staff experience with allotments and individual permittees, and litigation history and accompanying perceived risk of litigation in the field area were important factors in participants' perceptions of barriers to implementing OBM for fire risk management. Furthermore, perceptions of barriers to OBM were also influenced by the resource condition of the allotment (e.g.,

progression of annual grass invasion). Next, we summarize how formal and informal institutions interacted in our case studies and highlight instances of BLM field offices interpreting areas of discretion for implementation. We compare examples from each field area of pre-fire mitigation strategies and adaptations to annual variability through grazing permitting and explore how combinations of informal and formal institutions and resource conditions created barriers or opportunities for implementation (Table 2.5).

Policies and Formalized Processes: NEPA Procedures, Potential Litigation

BLM reportedly had limited capacity to undertake additional formal processes that were perceived to accompany outcome-based approaches. To use grazing as a tool to achieve the desired outcome of addressing emergent fire risk factors (e.g., following a particularly productive growing season or annual grass establishment after a fire), most BLM staff in all field areas agreed that terms and conditions such as timing, intensity, or duration of grazing would need to be modified on grazing permits for the associated allotments. Changing permits requires analysis of the proposed actions under NEPA and can be time consuming. As a result, it is difficult for the BLM to authorize grazing to address emergent fire risk factors in a timeframe relevant to seasonal production and fuels management. For example, one permittee described seeking to change how he used an allotment that had been invaded by medusahead since the permit was last reviewed in order to better manage the new resource condition and heightened fire risk:

> *[The BLM] won't let you try something new. "Well how about if we try this? I think it would be better for the grass if we did this and tried that."…They say, "No. We have to write a new RMP [Resource Management Plan] first or have to do NEPA or we have to renew your permit. Let's wait,"…And then those things never happen. They'll be 25 years behind—or whatever they are on permit renewal—so it might not happen till your grandkids are running the ranch* (Permittee-B-07).

All BLM interviewees described the need to craft NEPA documentation for outcome-based proposals that would not attract attention from litigants or be able to withstand legal scrutiny should aspects of a grazing permit or other activities on BLM land be litigated. Informal institutions such as staff experience and leadership were associated with navigating potential litigation as a barrier to OBM implementation. For example, Field Area C and its associated district office had experienced an active history of lawsuits over public land grazing. BLM interviewees cited this litigation history in leading Field Office C to adapt their approaches to permitting and managing litigation risk:

> *We're kind of limiting our [legal] exposure to some extent. Areas that are going good—permittees don't need something changed, or we don't need something changed for resource management—we're going to leave it alone. And if we need something changed, it can be fixed with little tweaks like a new stretch of fence, extension of a pipeline, or even a change of season…we're going to try it and see if it works. Then we don't have to go through a complete permit renewal…The folks who are watching us and don't support some of this stuff don't get too excited [i.e., bring a lawsuit] if you're just kind of tweaking a few things* (BLM-C-08).

Multiple BLM interviewees in Field Office C emphasized that when they could, they preferred to make small changes to permits that, in their experience, would extend staff capacity and avoid potential litigation. However, as a result, many permittees in Field Area C felt BLM staff were "afraid" or unwilling to make more substantive changes to permits, such as authorizing more animal unit months (AUMs; the amount of forage needed to sustain one cow, five sheep, or five goats for 1 mo) where productive crested wheatgrass seedings (*Agropyron cristatum* [L.] Gaertn) posed a fire risk.

Culture and Norms: Beliefs About Grazing to Manage Fire Risk

Beliefs about grazing to effectively manage fuels while also meeting standards of rangeland health were areas of BLM and permittee disagreement and were thus perceived to create barriers to OBM implementation. Annual grass monocultures or non-native crested wheatgrass seedings were dominant in some allotments in Field Areas B and C. In these cases, permittees believed their current forage utilization levels were contributing to seasonal fire risk and agreed that the BLM issuing them more AUMs would allow them to better use grazing to manage fuels in some areas of their allotments. However, many BLM and other agency interviewees were skeptical about the effectiveness of widespread grazing to reduce fire risk, citing that in order to reduce fuels to an extent that fire behavior is influenced, utilization would need to be increased to such a level that they would have concerns about habitat quality for sensitive species such as greater sage-grouse (*Centrocercus urophasianus*) and meeting Idaho BLM standards of rangeland health.

Differences in permittee and BLM staff beliefs about the efficacies of grazing to manage wildfire risk were particularly notable in Field Area B, where all categories of interviewees agreed that allotments dominated by annual grass monocultures pose significant fire risk. In addition, FLPMA guides how the BLM must administer rangeland uses. BLM interviewees in Field Area B described being pulled in multiple directions by frequent fires and a diversity of demands related to

the nonranching public, such as rights-of-way and recreation access. High staff turnover combined with limited staff resources devoted to grazing culminated in low continuity in staff experience with permittees or the resource condition on allotments:

> *We're kind of in the thick of it right now, trying to figure out what all we are supposed to be accomplishing as a field office. There has not been a large continuity of managers, particularly for about the last decade. I think that's led to some of the disconnect [with permittees]* (BLM-B-21).

Permittees in Field Area B referenced this discontinuity in experience in explaining why they believed BLM permit administrators would not work with them to address annual grasses and fire frequency on their allotments. For example, many permittees believed fall or early spring grazing would help them reduce annual grass abundance and, thereby, competition with native perennial grasses. But in many instances, these alternative seasons of use would require a change to their permit's terms and conditions and, "All of us around here have asked for changes [to our permits]. It's a complete waste of time. They just say no…There's no give whatsoever" (Permittee-B-05). High turnover among field area leadership and rangeland management specialists (RMSs, who administer grazing permits) resulted in low trust and infrequent communication between BLM staff and permittees.

Culture and Norms: Permittee-Agency Relationships, Discretion After Fire

BLM guidance for livestock grazing after fire in the field areas is found in an emergency stabilization and rehabilitation (ESR) document produced after a specific fire event or in field areas' land use plans or RMPs. Nearly all permittees in Field Area B expressed desire to graze in the fall or winter following a fire, believing that livestock grazing could curtail annual grass invasion on bare ground in burned allotments. But Field Area B's procedures following fire and development of site-specific ESR plans are guided by a district-wide normal fire rehabilitation plan that states:

> *Burned but not re-vegetated areas will be closed to livestock grazing for a minimum of two growing seasons following the season in which the wildland fire occurred to promote recovery of burned perennial plants and/or facilitate the establishment of seeded species…Livestock closures for less than two growing seasons may be justified on a case-by-case basis, based on sound resource data and experience.*

Despite the language allowing for case-by-case discretion, BLM and other agency interviewees pointed to the procedures governing postfire rehabilitation as limiting opportunities to

experiment with livestock grazing after fire. When asked about factors that are important in making the decision to again authorize grazing on an allotment in Field Area B, a BLM interviewee explained:

> *A lot comes down to the conditions pre-fire and the relationship that the permittee has with the local field office staff…if you have a high-trust relationship with that permittee, you can say, "Yeah, go ahead and take care of it. We'll come out and check on it, but just keep your cows off this [burned area]," and you can work off an agreement that way. If you have a permittee with a low trust relationship with the Field Manager, the Field Manager is not going to take that risk. They're going to say, "It's just not worth it. We're going to rest the pasture for another year"* (BLM-B-12).

Permittees in Field Area B felt exclusion of grazing after fires was relatively rigid. Although there was agreement among all interviewees in Field Area B regarding annual grass proliferation contributing to poor resource condition and frequent fires, beliefs about the usefulness of grazing to curtail annual grass invasion following a fire, as well as an absence of long-term permittee-agency relationships, were all barriers to adaptive approaches after fire to manage future fire risk.

Field Area C also operated under a programmatic ESR plan that details how site-specific ESR plans are to be developed following individual fires. Terms and conditions for allotment closures are issued in grazing decisions after fires. Although interviewees in Field Area C agreed this often amounted to exclusion of grazing for two growing seasons, instead of specifying a period of time an allotment must be closed, the programmatic ESR plan contains objectives that must be achieved for grazing to resume in natural recovery areas (i.e., not seeded following a fire), such as amount of bare mineral soil and a qualitative visual assessment of plant vigor. Similarly, Field Area A's land use plan guides postfire rehabilitation and does not specify that livestock grazing should be excluded for two growing seasons after fire. Instead, the document contains resource objectives including one that requires 70% of the cover of native perennial bunch grasses before the fire before livestock grazing can resume.

The "case-by-case" condition in Field Area B's programmatic ESR document and the threshold based on resource condition in Field Areas A and C illustrates that even within formal guidance for postfire rehabilitation, BLM staff had discretion to determine the suitability of livestock grazing and how it might be useful for achieving resource objectives. However, this discretion within

formal processes was influenced by informal institutions such as beliefs about resource management and relationships with permittees.

Experience: Leadership and Staff Tenure, Knowledge of Permittee Stewardship

In instances where outcome-based approaches were being used to address fire risk, BLM interviewees usually described working within existing permit terms and conditions or an approved EA (i.e., no new NEPA analysis is required) to overcome staff capacity challenges. These activities included, for example, implementing targeted grazing as a biological control measure to manage fuels buildup under an existing EA and dormant season grazing to remove prior seasons' growth in cases where a permit's season of use includes fall or winter.

Although targeted grazing is authorized in the BLM's grazing regulations to reduce fuel loads when resources on the public lands "are at substantial risk of wildfire" (43 C.F.R. § 4190.1[a][1]), there was widespread agreement from all types of interviewees that targeted grazing to manage fire risk was more acceptable to the public if it were authorized as a fuels treatment rather than through the BLM's grazing program. To overcome this barrier to implementing targeted grazing to reduce fuels, Field Office A opted to authorize targeted grazing as a biological treatment through a vegetation EA implemented by BLM's fuels program (rather than the grazing program), in which "experimental" application of cattle, sheep, or goats are considered a method for managing fuels buildup in designated areas such as roadsides and firebreaks. There had been few public land grazing lawsuits in the field area, and interviewees referenced a culture of experimentation and feelings that they had support from the field manager and district office to test new approaches rather than focus on avoiding lawsuits,

> *We're really in this gray realm with targeted grazing. How do we authorize it? How do we do the NEPA? I've always been one to exploit those gray areas and say, 'Unless I've got a policy telling me explicitly I can't—I'm going to do it.' That's how we're approaching targeted grazing in this office* (BLM A-18).

Field Office A was notably characterized by experienced, long-tenured staff (e.g., the most recently hired RMS had been there for 8 yr) and consistent leadership known in Idaho for engaging in collaborative processes with rangeland users.

There was broad agreement among BLM staff, permittee, and other agency interviewees that an outcome-based approach—even if implemented through existing permit terms and conditions—was only appropriate for trusted permittees with proven records of meeting the BLM's Standards for Rangeland Health. This sentiment was aligned with BLM grazing regulations, which explicitly state

that allotment management plans shall, "Specify the limits of flexibility, to be determined and granted on the basis of the operator's demonstrated stewardship" (43 CFR § 4120.2[a][3]). When authorizing permits for permittees with records of good stewardship, RMS staff in Field Office A reported writing "off dates" in the terms and conditions (i.e., when livestock must be moved out of the allotment) 2 wk later than a permittee has historically needed so that they overlap with the turnout date on the permittee's subsequent allotment in their grazing rotation:

> *We write the season [of use] just as wide as we think it might need to go. So instead of giving [the permittee] a June 15th date when their [U.S. Forest Service] permit starts on the 16th, we're going to write [their BLM permit] until the 20th or the 25th. They won't actually use that time, but should the Forest Service say, "Hey, the range isn't ready [for livestock grazing]," we can help* (BLM-A-08).

They explained that this practice retains the existing stocking rates and AUMs and isn't meant to keep livestock on allotments longer. Rather, it was the field office's strategy to accommodate annual variability and conditions indicative of range readiness while also eliminating the need to complete additional NEPA analysis. This practice in Field Area A was related to supportive leadership, knowledge of permittees with proven histories of meeting Standards for Rangeland Health, and shared understanding between permittees and BLM staff regarding range readiness and overall rangeland resilience to disturbances such as fire; this practice was further supported through formal processes, that is, ensuring that all administrative procedures for livestock permitting were completed via the permit renewal process.

Discussion

Through comparative case studies of three BLM Field Areas in Idaho, we investigated barriers to implementing outcome-based approaches to manage fire risk on Idaho's BLM rangelands. We found that informal and formal institutions, in addition to resource condition within field areas, were mutually reinforcing and, together, affected perceptions of barriers to using outcome-based approaches to manage fire risk (Figure 2.2). Our findings are consistent with other scholarship that finds biophysical factors, as well as institutional context, shape the barriers to adaptive management (Reiners, 2012). In our study, some field offices used gray zones— areas of interpretation within existing policies and regulations—to manage weeds or fuels. These gray zones were created by formal administrative tools including terms and conditions for grazing permits, planning documents such as ESR following fires, and NEPA documents authorizing tools such as targeted grazing. Our study revealed that informal institutions were influential in whether a field office explored gray zones

for OBM implementation. These institutions were related to BLM staff tenure and relationships with permittees, experience and depth of staff knowledge of allotment condition and permittees' histories of stewardship, beliefs about the efficacies of grazing to manage fire risk, and leadership and staff expertise in navigating NEPA and potential lawsuits.

Although all field offices remained, as required, within the sideboards of legislative rules including FLPMA and NEPA, we saw differences in use of administrative tools among our case studies. Administrative tools are formal institutions, but they interact with informal institutions and are products of agency interpretation. Administrative tools created within a field area (e.g., RMPs or EAs) are thus understandably diverse and act differently to expand or restrict gray zones and, thereby, opportunities for adaptive approaches to fire risk management. Field Office A used resource objectives to guide resumption of livestock grazing following fire, written into their land use plan. This gave Field Area A's BLM staff and permittees some latitude to respond to environmental variability and freedom from a one-size-fits-all policy approach to authorizing livestock grazing following fire. Field Area B's procedure for livestock grazing following fire was authorized through a programmatic EA specifying ESR procedures. It recommended exclusion of livestock for 2 yr following fire but also offered BLM staff case-by-case discretion. In practice, permittees in Field Area B felt this discretion was rarely used and viewed the relative rigidity in resumption of livestock grazing as a lost opportunity to curtail annual grass invasion and, thereby, fire risk. But Field Office B had high turnover, an absence of long-term permittee-agency relationships, and low capacity as staff tended to other nongrazing interests. These conditions culminated in field office culture that preferred prescriptive, rather than adaptive, approaches to post-fire management despite the provision of "case-by-case" discretion within its administrative tools. Taken together, our findings highlight that even within arenas of discretion for implementing adaptive approaches, agency culture, including the interactions of beliefs about resource use and willingness to experiment, created barriers to adaptive management (Koontz and Bodine, 2008; Frohlich et al., 2018).

Scholars agree that adaptive management of dynamic natural systems is in tension with rigid administrative law (Fischman and Ruhl, 2016). Indeed, perceived barriers to implementing OBM in Field Areas B and C stemmed from BLM staff feelings that adaptive approaches could not be reconciled with current policies. But our study also shows that this tension may be eased by informal institutions present within field areas and allow agency managers to "see" gray zones. Two of these informal institutions were permittee-agency relationships and beliefs about resource management. When these relationships are absent or beliefs misalign, collaborative adaptive management highlights the roles of participatory processes and stakeholder engagement in building trust among

actors, increasing transparency in decision making, and integrating multiple knowledge systems (e.g., Fernández-Giménez et al., 2019; Wilmer et al., 2018). Unlike OBM in Idaho, these formal venues for adaptive management implementation are useful for assembling knowledge from diverse experiences to address multiple actors' goals. Monitoring is also essential to adaptive management; joint monitoring between agency staff and permittees can begin to address differences in beliefs about resource management (Fernández-Giménez et al., 2005). Furthermore, technical learning between agencies and permittees about the outcomes of management activities can promote ongoing relationships (Williams and Brown, 2018).

Agency support and flexibility are necessary for adaptive management (e.g., Benson and Stone, 2013); it was here we saw an outsized role for leadership within field areas in implementing outcome-based approaches, especially when those approaches run counter to traditional agency culture (Koontz and Bodine, 2008; Archie et al., 2012). Despite perceived risk of OBM incurring lawsuits, leadership and experience emboldened BLM staff in Field Area A to implement experimental fuels reduction via targeted grazing ("Unless I've got a policy telling me explicitly I can't, I'm going to do it"). Field Office A's approach is aligned with Landbergen and Orosz's (1996) concept of "risk taking for a purpose," wherein public managers' use of the gray zone is most effective when it is part of a broader strategic effort (see also Abrams et al., 2018). This broader strategic effort may serve to further refine the boundaries of the gray zone through institutional learning, in which managers reflect on and modify adaptive management components (i.e., decision elements, objectives, and alternatives; Williams and Brown, 2018).

Checks on agencies by the courts can also create accountability and consistency in agency discretion. However, perceived risk of litigation can also act as a force to stifle adaptive approaches (Schultz, 2008; Bjorkland, 2013; Craig and Ruhl, 2014). In our study, a history of frequent litigation over public lands grazing in the field areas or Idaho more generally (e.g., Lewin et al., 2019) led some BLM staff, particularly in Field Area C, to prioritize lawsuit avoidance over OBM implementation because of uncertainty in legal outcomes. Activities that are viewed as too politically or logistically difficult are known to constrain adaptative management; managers faced with such conditions often instead opt for "small-scale management experiments," which can improve management "around the edges" (Allen and Gunderson, 2011; 1382). Within the context of our study, we see Field Office C carrying out this approach by experimenting within the gray zone where the legal risk is perceived to be relatively low (e.g., changes in season of use but not large increases in AUMs). To manage legal risk in adaptive management approaches, agencies that define clear processes to achieve the desired

outcomes, monitoring thresholds, and actions triggered by thresholds are prepared to withstand scrutiny under substantive and procedural law (Allen et al., 2011; Fischman and Ruhl, 2016).

Lawsuits or further legislative action can be useful for clarifying policy and making the gray zone explicit (Landsbergen and Orosz, 1996; Allen et al., 2011). However, clarifying or formalizing actions within the gray zone can potentially shrink areas of implementation discretion. This tension is fundamental in rangeland governance: In a complex and dynamic system, it is difficult to develop formal institutions that effectively protect resources but also include legal avenues for experimentation and adaptation to uncertainty (Reiners, 2012). Although some interviewees in our study were reluctant to implement outcome-based approaches given its inherent uncertainties, further clarifying OBM through lawsuits, legislative actions, or implementation guidelines (i.e., institutionalization; Moseley and Charnley, 2014) may restrict the very purpose of OBM, that is, to escape a one-size-fits all approach to grazing administration and adaptively respond to place-specific challenges.

Implications

OBM is a recent experimental initiative meant to advance adaptive management approaches to respond to annual variability on BLM rangelands. We find that informal institutions such as field area leadership, agency culture, permittee-agency relationships, and history of litigation interact with formal institutions such as NEPA procedures and grazing regulations and create perceptions of barriers or opportunities for implementation. Our study highlights the role of informal institutions in implementing OBM; differences in the informal institutions among field areas lead to different interpretations of latitude found within formal institutions (gray zones) and, thus, different perceptions of the feasibility of OBM implementation. The findings here suggest promising avenues for adaptive management in public lands contexts—a setting characterized by formalization and bureaucracy—but show less promise if local agency offices lack leadership inclined to experiment, experienced staff, relationships with resource users, or shared beliefs regarding resource management challenges.

This research also has implications for public land management beyond grazing and fire risk management. First, in a complex governance system, it is important to continue to assess types of barriers to implementation and how they can be addressed; our findings indicate that barriers were not solely derived from inflexible federal policy but rather came from both interpretations of latitude found within administrative tools and informal institutions at play within field areas. Second, although substantive policies can set parameters for policy implementers, our study indicates that in the absence of formal policy (i.e., legislative rules) on OBM implementation, informal institutions,

such as permittee-agency relationships, shared understandings of desired outcomes and how to achieve them, and leadership committed to experimentation within the gray zone, have a role in either reinforcing or overcoming implementation barriers.

Acknowledgments

We gratefully acknowledge BLM staff, grazing permittees, and other agency and NGO interviewees in the Idaho Falls, Twin Falls, and Boise BLM Districts for their participation in this study. This research was supported by a Joint Fire Science Program Graduate Innovation (GRIN) Award (18-1-01-18), US Dept of Agriculture National Institute of Food and Agriculture McIntire Stennis projects (1019024, 1015330), a University of Idaho (UI) College of Natural Resources Curt Berklund Graduate Research Scholar Award, and a UI Office of Research and Economic Development Research Infrastructure and Scholarly Excellence (RISE) Graduate Research Fellowship.

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Tables

Table 2.1. Wildland fires larger than 100 000 acres 1997−2019 in Bureau of Land Management (BLM) districts with rangelands in Idaho (NIFC 2020).

BLM District	Fires larger than 100,000 acres
Boise	Pony Complex (2013), Soda (2015)
Idaho Falls	Mule Butte (1999), Eastern Idaho Complex (2000), Crystal (2006), Sheep (2019)
Twin Falls	Clover (2005), Murphy Complex (2007), Rowland (2007), Elk Mountain (2007), Long Butte (2010), Kinyon Road (2012), Flattop 2 (2012), Beaver Creek (2013)

Table 2.2. Summary of categories of participants interviewed for each case. Cases were anonymized due to the sensitive nature of findings and relatively small sample sizes of Bureau of Land Management (BLM) staff within field offices.

Interviewee category	Number of interviews
Field Area A	
BLM staff	7
Permittees	10
Other agency, NGO	7
Field Area A Total	24
Field Area B	
BLM staff	12
Permittees	10
Other agency, NGO	1
Field Area B Total	23
Field Area C	
BLM staff	9
Permittees	13
Other agency, NGO	1
Field Area C Total	23
Total	70

Table 2.3. Desired fire risk management activities frequently identified by participants.

Type of fire risk management	Frequently referenced desired activities
Pre-fire mitigation	Treat invasive annual grasses with herbicides or targeted grazing
	Manage fuels buildup by adjusting timing, duration, or intensity of grazing following the growing season (e.g., fall or winter grazing)
	Increase prescribed burning to reduce fuels, improve rangeland resilience
Fire preparedness	Construct fuel breaks (mechanically or with livestock)
	Maintain existing fuel breaks (planting fire resistant species, discing, spraying)
Post-fire recovery	Winter or early spring grazing following fire to exclude annual grass establishment

Table 2.4. Relatively important components in participants' perceptions of barriers to outcome-based rangeland management categorized in terms of formal and informal institutions. Evidence for these components and associated institutions were accumulated through qualitative analysis in NVivo.

Component	Institution type	Examples
Policies and formalized processes	Formal	Procedures required by NEPA
		Terms and conditions
		Grazing regulations
		Budget
		Standards for Rangeland Health
		Judicial decisions
Culture and norms	Informal	Leadership
		Inclination to experiment
		Shared vision (individual, interagency interactions)
		Beliefs about resource management
Experience	Informal	Staff tenure
		Knowledge of allotments, permittees
		Permittee-agency relationships
		Assessment of range readiness
		Prioritizing workloads
		Litigation history

Table 2.5. Comparison of resource conditions and relevant formal and informal institutions involved in examples of pre-fire mitigation strategies and adaptations to annual variability through grazing permitting in each field area.

	Field Area A	Field Area B	Field Area C
Resource condition considerations	Monitoring data must show allotments meet Standards for Rangeland Health	Due to frequent fires, allotments lost shrub component and transitioned to annual grass monocultures	Some allotments dominated by crested wheatgrass; interviewees agreed authorized AUMs were too low given the productivity of the areas and resultant fuel loading
Relevant formal institutions	Grazing regulations; required NEPA analysis when changing terms and conditions; Standards for Rangeland Health	Required NEPA analysis when changing terms and conditions; FLPMA mandating BLM staff manage for multiple uses	Grazing regulations; required NEPA analysis when changing terms and conditions; judicial decisions
Relevant informal institutions	Presence of permittee-agency relationships; long-tenured BLM staff familiar permittees' stewardship records; supportive field office leadership inclined to experiment	Absence of permittee-agency relationships; low continuity of BLM staff knowledge of allotment condition; different beliefs about grazing to manage fire risk; strained staff capacity due to prevalence of non-grazing uses in the Field Area	History of lawsuits in the Field Area; experienced BLM staff sensitive to actions that may incur a lawsuit
Resulting perceptions of barriers or use of gray zones	When renewing grazing permits, BLM staff expanded some permittees' on and off dates in terms and conditions to accommodate annual variation in range readiness	BLM staff were unable to adjust some permits' terms and conditions after resource condition transitioned to new state	BLM staff were reluctant to make "big" changes to permit terms and conditions (e.g., increasing AUMs), but instead made "little tweaks" (e.g., changes to seasons of use or new fencing)

Figures

Figure 2.1. Bureau of Land Management (BLM) districts and associated field areas in Idaho. Three field areas were selected as case studies, one in each BLM district with rangelands (Boise, Twin Falls, and Idaho Falls Districts). Credit: Chelsea Pennick, University of Idaho.

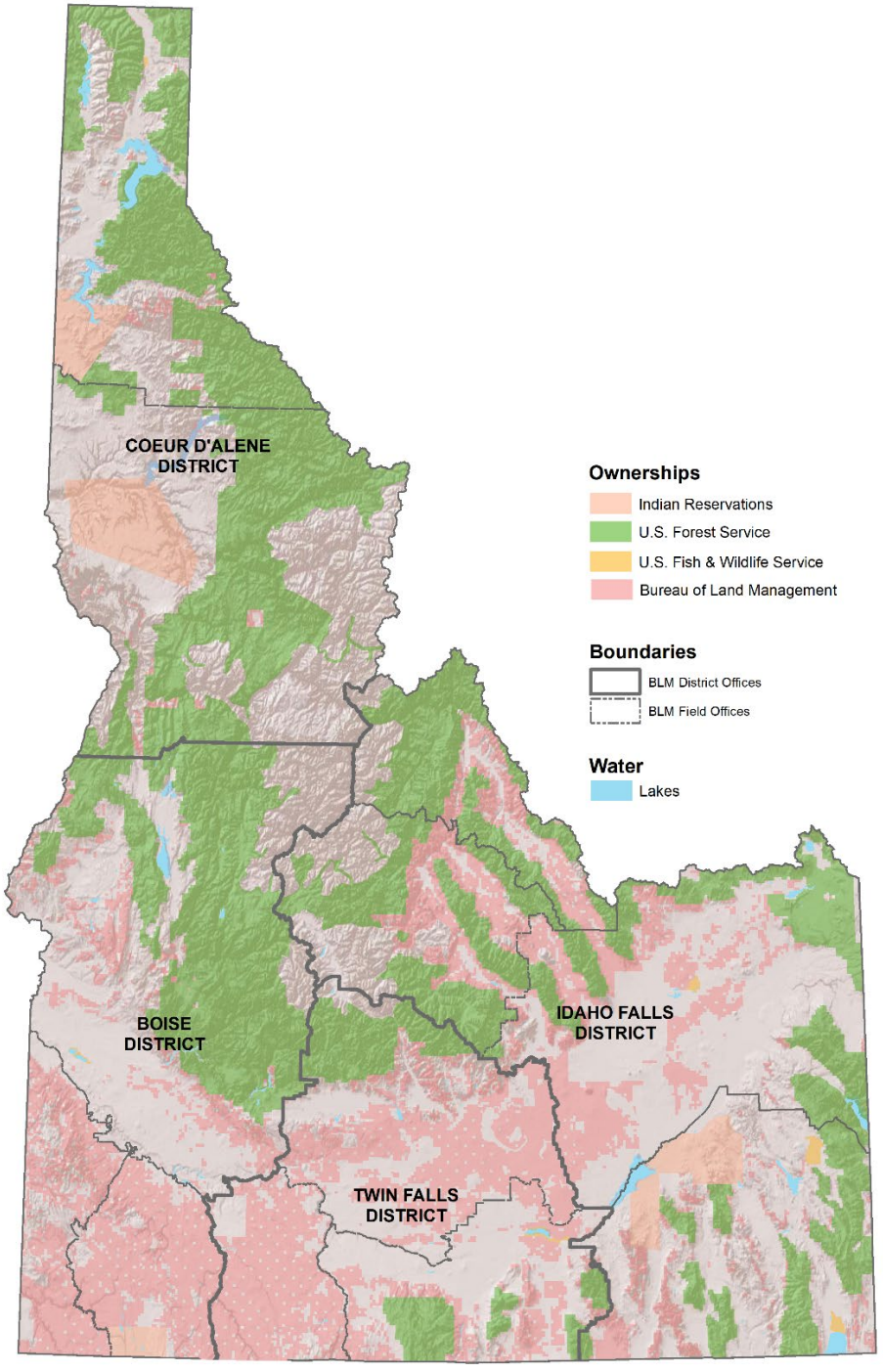
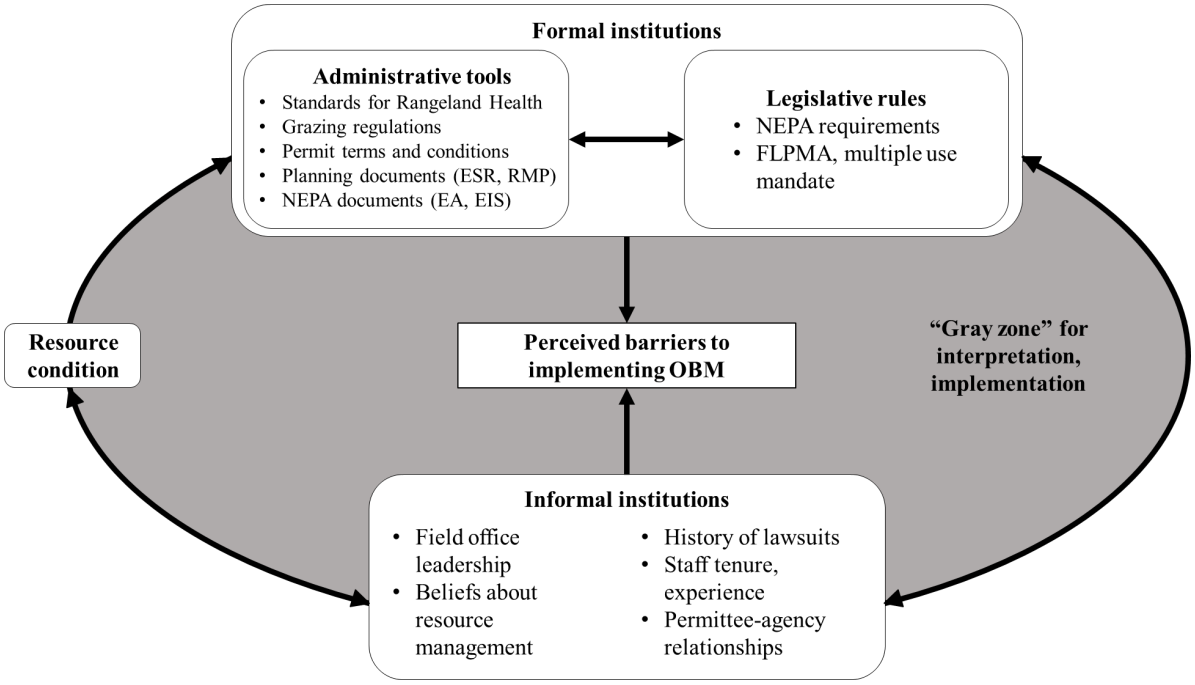


Figure 2.2. Conceptual figure of informal and formal institutions and resource conditions. Our study finds they are interactive and mutually reinforcing and create context in which barriers are perceived by study participants. Within these interactions, gray zones of possible adaptation are created. Institutional components interact both within and among the boxes. For example, resource condition informs permit terms and conditions (and vice versa); staff tenure and experience influence permittee-agency relationships. Abbreviations: Environmental Assessment (EA); Environmental Impact Statement (EIS); Emergency Stabilization and Rehabilitation (ESR); Federal Land Policy and Management Act (FLPMA); National Environmental Policy Act (NEPA); Resource Management Plan (RMP).



Chapter 3: The Institutional Work of Learning and Legitimation: Lessons from a Fledgling Co-management Arrangement

Abstract

Co-management arrangements incrementally develop over time. Institution-building can legitimize actions under new arrangements and, ultimately, institutionalize new policies or practices. We examine the conception and early implementation of outcome-based rangeland management (OBM) in Idaho, involving the Bureau of Land Management (BLM) and livestock grazing permittees working within existing administrative structures to adaptively respond to environmental change and uncertainty on BLM-administered rangelands. Using qualitative analysis of in-depth interviews, documents, and media, we trace features of co-management as OBM unfolded between 2017 and 2020 in Idaho, focusing on the roles of learning and legitimacy in institutionalizing OBM practices within the BLM. We find a lack of clarity and formal guidance for OBM implementation limits perceived legitimacy and uptake at operational levels. Some savvy field office staff are implementing elements of OBM and seek to legitimize their actions through approval from higher levels or through successfully defending them in court. District offices at collective choice levels have a large role in sharing this know-how being developed within field offices. Without the production of formal institutions alongside localized instances of OBM implementation and know-how shared through horizontal networks, legitimation of OBM and eventual institutionalization will be limited. We conclude by offering insights on how aspects of institutional work may create the structures for legitimating OBM for broadscale implementation.

Introduction

U.S. Western rangelands are complex adaptive systems where issues of scale, fit, and uncertainty make it difficult for managers to nimbly respond to real-time conditions, interannual variability, or events such as wildfire (Folke et al., 2007; Cumming et al., 2006; see Wollstein and Johnson, in review). To accommodate social-ecological dynamics, natural resource governance has diversified from purely government-led approaches to ones that incorporate civil society and resource users in decentralized or devolved arrangements (Berkes, 2010; Reed and Bruneel, 2010; Pierre, 2012). Examples of such arrangements from U.S. western rangelands include participatory natural resource management, community-based natural resource management, Collaborative Adaptive Rangeland Management, and co-management (e.g., Fernández-Giménez et al., 2008; Smedstad and Gosnell, 2013; Abrams et al., 2018; Wilmer et al., 2018; Wollstein and Davis, 2020). These models

relocate power, responsibility, and authority to governance levels where management can be more responsive to local conditions (Lemos and Agrawal, 2006; Armitage, 2008).

Co-management, in which governmental actors and resource users share some degree of power and responsibility (Berkes et al., 1991), is thought to be well-suited to address the uncertainty and change that characterizes complex systems by linking a broad range of knowledge dispersed among actors across multiple levels, scales, and institutions (Imperial, 1999; Berkes, 2009). As "collaborative problem-solving," co-management arrangements use established principles of collaboration (Carlsson and Berkes, 2005). A co-management model may be particularly relevant on Western rangelands in scenarios in which there is an alignment in objectives and motivations at the local level that can be strategically leveraged by resources and decentralization of discretion and authority (e.g., Abrams et al., 2018; Wollstein and Davis, 2020; Wollstein and Johnson, in review).

Although extensive scholarship has enumerated components, outputs, and governance configurations of co-management (e.g., Armitage et al., 2007; Plummer et al., 2012), less attention has been given to arrangements that incrementally develop in response to new policy initiatives or guidance. Importantly, co-management develops over time and evolves through deliberation, negotiation, learning, legitimation, and institution-building (Carlsson and Berkes, 2005; Plummer and Armitage, 2007; Berkes, 2009). Thus, co-management can be understood as a process—rather than an end state—that occurs on a continuum of formal and informal interactions (Carlsson and Berkes, 2005; Frey et al., 2016; Pearson and Dare, 2019). What are the benefits and limitations of less formal co-management structures and processes that characterize nascent stages of policy implementation? What institutional work is necessary to legitimate such arrangements and realize the promises of co-management?

Our study explores these questions by examining the conception and early implementation of Outcome-based management (OBM) in Idaho, involving the Bureau of Land Management (BLM) and livestock grazing permittees working within existing administrative structures to adaptively respond to environmental change and uncertainty on BLM-administered rangelands. We first review features of co-management and the institutional landscape, focusing on learning and legitimacy and intersections with institutional work in advancing co-management arrangements over time. The following section describes OBM, its primary intentions, and development in Idaho. We analyze the formal and informal structures and processes that accompanied OBM as it unfolded in Idaho by examining learning and legitimization of actions. In doing this, we contrast the delivery of OBM in practice with what OBM was envisaged to be at its conception, and its current limitations in reaping the promised outputs of co-management. We conclude by offering insights on how aspects of

institutional work may advance this case from a mere consultation process to adaptive co-management in a federal land management setting.

Literature review

Co-management has been extensively investigated in both theory and practice. Although there is no single definition, co-management involves some degree of power and responsibility sharing between government and resource users (Berkes et al., 1991). In general, co-management arrangements are contingent upon antecedents such as willingness for local users to contribute, opportunity for negotiation, leadership, and shared vision. Scholars agree that co-management processes require pluralism, communication, transactive decision-making, learning, and shared action (Plummer and Fitzgibbon, 2004; Armitage et al., 2007). Ideally, outcomes include enhanced decision-making, legitimization of actions, and increased capacity to take on more complex issues across scales (Plummer and Fitzgibbon, 2004; Berkes, 2009).

Co-management on a Continuum

Like other modes of decentralization, co-management arrangements occur on a continuum (figure 3.1; Pomeroy and Berkes, 1997; Carlsson and Berkes, 2005; Berkes, 2009; Frey et al., 2016; Pearson and Dare, 2019). On the less intensive end of the continuum, co-management may take the form of simple information exchanges among relatively isolated actors while the state retains control over decision-making and actor engagement (e.g., Hung, 2017). The opposite end of the continuum is characterized by formal delegation of management functions (e.g., new legislation or a Memorandum of Understanding), where state control is dispersed throughout a partnership network (e.g., Ward et al., 2018). Learning through robust networks and formal institutions such as enabling policies distinguish more intensive co-management arrangements (Armitage et al., 2007; Frey et al., 2016; Pearson and Dare, 2019).

The intensity or formality of the partnership ideally reflects the prevailing institutional context and serves to produce desired outcomes (Moseley and Charnley, 2014; Abrams et al., 2015; Pearson and Dare, 2019). In instances in which the state has poorly developed relationships with the local community or there is high external scrutiny of federal land management decisions, the state may opt to adhere to a centralized model and retain control of stakeholder engagement and decision-making (i.e., a consultative model). If there is some trust among actors, supporting institutions, and networks for social interactions and knowledge sharing, an intermediate collaboration model may be appropriate (Pearson and Dare, 2019). While non-governmental actors are engaged for negotiation and deliberation, they must accept that the state retains decision-making power in such a scenario (Ribot, 2002; Pomeroy and Berkes, 1997).

Co-management arrangements evolve incrementally over time (Carlsson and Berkes, 2005). Actors engaging in communicative action and learning through networks build trust and skills to navigate their institutional contexts (Armitage et al., 2007; Berkes, 2010; Abrams et al., 2015). If warranted and adequately networked and resourced, co-management arrangements can be shifted along the continuum toward more formalized processes as actors produce, change, or refine necessary institutions in support of shared action (Lawrence and Suddaby, 2006; Sandström et al., 2014; Pearson and Dare, 2019). Below, we consider legitimacy, learning, and linkages in co-management and the institutional work that produces or reinforces the institutions to stabilize (i.e., institutionalize) an early co-management arrangement.

Co-management and the Institutional Landscape

The institutional landscape is an important precondition for co-management, defined as the "…existing institutions, organizations and collaboration structures…[that] provides the context in which co-management processes evolve and influences incentives and conditions for collaboration" (Sandström et al., 2014; 62). When engaging in co-management or other governance innovations, actors are continuously modifying or reinforcing the institutional context within which they operate (Lawrence and Suddaby, 2006; Berk and Galvan, 2009; Abers and Keck, 2013). Thus, variance found in co-management is due to pre-existing institutions, as well as actor agency, that is, the actions actors undertake that legitimate and institutionalize processes or the arrangement over time (Lawrence and Suddaby 2006; Bitektine and Haack, 2015; Patterson and Beunen, 2019).

Where co-management is unfolding, structures are the pre-existing social norms and expectations, organizations, collaboration infrastructure (e.g., social capital), and policies that create conditions for whether collaboration can occur (Plummer and Fitzgibbon, 2004). Individuals exercise agency within these structures via purposive actions (and non-purposive ones; see Beunen and Patterson, 2019) that maintain, modify, or build institutions (Lawrence and Suddaby, 2006; Lawrence et al., 2009; Abers and Keck, 2013). While the interactions of structures and agencies shape institutions, it is the actions of actors within this context that can produce new institutions or change existing ones (Mahoney and Thelen, 2010; Lawrence et al., 2009; Bettini et al., 2015). This may take the form of, for example, informal agreements between actors regarding accepted norms or the creation of new procedures for implementing higher-level policy.

When such changes become embedded in existing institutional structures and are reproduced over time, the innovation or practice is considered to be institutionalized (Moseley and Charnley, 2014; Bisschops and Beunen, 2018; Bergsma et al., 2019). Below, we focus on the roles of legitimacy and learning in institutionalizing new policies or practices.

Legitimacy

Engaging in co-management increases actors' perceptions that actions—and the authority of actors to undertake them—are legitimate (Sandström et al., 2014). We consider legitimacy in terms of a group's collective acceptance of decision-making power, procedures, and rules (Suchman, 1995; Bitektine and Haack 2015). Co-management may offer an arena for participating actors to reconcile their different interests, build shared understanding, and develop common agreements (Sandström et al., 2014). Through these interactions, an identified action or even the arrangement itself will, over time, be collectively viewed as legitimate (e.g., Parkins and Mitchell 2005). When new practices, structures, or organizations are viewed as valid or consistent with social norms and fully integrated and reproduced through ongoing interactions, they exemplify what Bitektine and Haack (2015) refer to as "institutionalization of legitimacy judgements" (69).

In co-management, legitimacy is both an input and output, in which the qualities of co-management processes (input legitimacy) and resulting institutions (e.g., new policies; output legitimacy) are both important to participants' perceptions of the legitimacy of the arrangement (Sandström et al., 2014). Legitimation is the process through which a practice becomes legitimate, that is, acceptable in the context of current norms and values (Bitektine and Haack 2015). Linking co-management to existing governance structures, ongoing initiatives, or networks can ease initial adoption and enhance perceived legitimacy (Huitema et al., 2009, Sandström et al., 2014). This is known as mimicry in institutional work (Lawrence and Suddaby, 2006). Actors engaging in strategies that continue to modify the institutional environment can further bolster legitimacy and create or reinforce conditions for collaboration (Plummer and Fitzgibbon, 2004; Lawrence and Suddaby, 2006; Sandström et al., 2014).

In short, actors' participation in co-management—even in early or less formal arrangements—builds or reinforces institutional structures that further legitimizes actions undertaken through co-management processes. Therefore, actors' perceptions of the legitimacy of the arrangement is essential to effective co-management, regardless of its position on the continuum.

Learning

The written and unwritten rules that structure co-management and other governance arrangements can facilitate or limit the institutional work of learning. This institutional work involves actors acquiring, disseminating, and translating information, as well as creating, interpreting, modifying, and contesting rules to create opportunities for learning. These activities can lead to institutional change (Heikkila and Gerlak, 2018). Yet when processes that support the development or

extension of social relationships and networks and formalization of new routines or practices are absent, learning is unlikely to lead to any changes and will remain "non-binding discourse" (Pahl-Wostl, 2009; 361).

For learning to lead to institutional change, it cannot be limited to an individual's change in understanding; new understandings must also diffuse to members within the wider governance system through interactions between networked actors (Reed et al., 2010). Some scholars have conceptualized learning as a multilayered, iterative process. For example, the multi-loop learning concept associated with social learning allows for examining the roles of norms and formal protocols in learning and the subsequent outcomes. Double-loop learning occurs when actors examine the underlying values and assumptions behind knowledge, rules, or actions and a change in understanding follows. Triple-loop learning leads to a transformation in the structural context, such as governance processes (Keen and Mahanty, 2006; Armitage et al., 2008; Pahl-Wostl, 2009; Reed et al., 2010).

Co-management (and governance, more generally) include rules related to actors involved, their specific roles, and the scope of the problems they can address (Ostrom, 2005). Regarding actor involvement, different interests, backgrounds, knowledge types facilitate learning (Keen and Mahanty 2006); communication and interactions between actors are useful for developing shared and contextually-relevant understanding and produce creative problem-solving (Pahl-Wostl and Hare, 2004; Armitage et al. 2011). By convening diverse actors, dialectical learning may occur, in which discussion, deliberation, and confrontation yields new ideas and solutions (Van Assche et al., 2021). Yet limiting stakeholder involvement in a co-management process can be strategic for stabilizing networks or expediting decision processes (Sandström et al., 2014). The perceived costs and benefits of activities undertaken are also important in the institutional work of learning (Heikkila and Gerlak, 2018). If failed experiments are perceived as costly, learning will be limited. If co-management processes include opportunities for reflection, learning is likely to occur. Informal institutions such as leadership that reward experimentation, risk-taking, and generation of new ideas are important facilitators (Wollstein et al., 2021).

Linkages

Co-management is a means of linking different actors with access to different information, know-how, capacities, or other networks (Plummer et al., 2012). Horizontal linkages refer to interactions within a governance level (e.g., among field offices or between field office staff and permittees), while vertical linkages connect multiple governance levels within an organization (see Figure 3.2; Berkes, 2009). These networks of relationships can facilitate learning across levels and

scales (Armitage et al., 2008), potentially create social and political capital (Adger et al., 2005), and spread risk among parties (Carlsson and Berkes, 2005).Below, we describe the context in which the early co-management arrangement unfolded.

Outcome-Based Rangeland Management

The BLM is mandated to manage BLM rangelands for multiple uses, including sustainable livestock grazing that supports other rangeland values. To curtail and prevent resource degradation from livestock grazing, the Taylor Grazing Act (1934) assigned stocking rates to federal rangelands administered through a system of livestock grazing permits, which specify the timing and duration of grazing based on average forage production. Today, the BLM issues over 1,800 livestock grazing permits on nearly 12 million acres of BLM-managed rangelands in Idaho (BLM, 2022).

However, rangeland are highly dynamic systems; forage production and fire probability are primarily driven by precipitation, which varies widely from year to year (Holmgren et al., 2006; Pilliod et al., 2017; Smith et al., in press). Most grazing permits contain few or no mechanisms for strategically responding in a relevant time frame to conditions that deviate from averages (e.g., forage productivity) or unforeseen events such as wildfire (Wollstein et al., 2021). This highlights the inherent tension between traditional command-and-control approaches and the on-the-ground realities of a dynamic natural system (Cumming et al., 2006).

To address this tension and offer greater flexibility for managers and livestock producers to respond to environmental variability, “outcome-based rangeland management” (OBM) emerged in 2017 from conversations among rangeland leaders and stakeholders in Idaho. Proponents of OBM sought a collaborative approach to identify desired ecological, economic, and social outcomes for a community or management unit and accordingly enact grazing management decisions to reach those outcomes (IRCP, 2019). OBM emphasizes the use of the experiential knowledge of multiple rangeland stakeholders to make decisions that support the identified desired outcomes.

In step with the ideals of OBM, in early 2018 the BLM announced their selection of 11 Outcome Based Grazing Authorization (OBGA) demonstration projects in six western states. The OBGAs aim to demonstrate a collaborative and adaptive approach to grazing permit administration in which grazing permits incorporate ranchers’ (“permittees,” hereafter) and managers’ desired outcomes for a BLM grazing allotment (BLM, 2017). In fall of 2018, the BLM issued an Instruction Memorandum (IM) providing guidance to BLM staff on optionally integrating “greater flexibility” and OBM principles into grazing permit administration (IM 2018-109; Appendix A).

For our purposes, we use "OBM" as a collective term to refer to two or more actors working together to achieve desired outcomes through informal means or in following the BLM's 2018 IM, as well as those activities that occur through the formal OBGA demonstration projects. The intent of OBM is to promote desired outcomes on public rangelands while offering local actors discretion to determine how to achieve them. At the local level, state actors (i.e., BLM administrators) are encouraged to engage with nonstate actors (i.e., permittees) to navigate administrative barriers to flexibility that have historically been the exclusive purview of the state. The emphasis on performance over prescription and inclusion of nonstate actors in decision-making is aligned with general principles of new environmental governance and devolution (Pierre, 2012). Thus, we consider OBM and associated institutions—both formal (i.e., the 2018 IM, the OBGAs) and informal (e.g., using outcome-based approaches within traditional permits; see Wollstein et al., 2021)—to be an example of an early co-management endeavor.

Design and Methodology

Over the duration of this study from fall 2017 through 2020, OBM in Idaho transitioned from an idea discussed in multi-stakeholder groups convened by the Policy Analysis Group (PAG) and Rangeland Center at the University of Idaho (UI), to an initiative advocated by Idaho Rangeland Conservation Partnership (IRCP), and then implemented to varying degrees by BLM staff and permittees in field areas with conducive institutional conditions (see Wollstein et al., 2021; Table 3.1). During this period, we convened several multi-stakeholder conference calls and one in-person listening session, and attended events that included scientist, manager, and permittee presentations of OBM principles and implementation (e.g., IRCP's 2019 annual meeting and Society for Range Management's annual meeting in 2020). In these venues, we sought to conceptually understand OBM as a it was being conceived, identify actors and their roles, and clarify needs for on-the-ground implementation.

This study focuses on how the concept of OBM unfolded and took shape, and the institutions that emerged as OBM progressed to implementation in Idaho. Thus, our study design was necessarily exploratory to accommodate new policy, institutional developments, and other emergent phenomena from OBM inception to implementation (Altheide and Johnson, 2011). Table 3.1 traces our evolving research process by presenting research activities and concurrent developments in OBM that informed our study design, research questions, and approach to data collection.

Data Collection

Multiple sources of data were used to construct the social and policy context in which OBM unfolded and to triangulate our findings (Maxwell, 1996). Data were collected by gathering relevant

documents and media and via participant observation and semi-structured interviews through one listening session held in winter 2017, exploratory interviews in 2018, and in-depth interviews in 2019 and 2020. Our data collection activities were approved by the UI's Institutional Review Board (protocol #17-232). The purpose of undertaking these activities over multiple years was to capture the working processes from the inception of ideas associated with OBM to the formal implementation of the OBGA pilots, to the subsequent diffusion of outcome-based approaches into wider BLM processes with permittees.

For this study, we limit our exploration to BLM district and field office staff interpreting and implementing outcome-based approaches in Idaho. BLM field offices are the operational level of governance, where grazing permits are administered; BLM staff work directly with livestock grazing permittees and other agencies and organizations that manage resources or values on BLM-managed lands. Field offices receive policy guidance from district offices at the collective choice level, while the BLM districts are overseen by the state and national BLM offices, which craft policy at the constitutional level (Figure 3.2; Ostrom, 1990). Although co-management, by definition, includes two or more governance scales (Berkes, 2009), we specifically focus on how the BLM, the primary state actors embedded in this arrangement, have understood, interpreted, and implemented elements of OBM.

In spring and summer 2018, we conducted 27 exploratory interviews with key-informants from six BLM field areas within the Boise, Twin Falls, and Idaho Falls BLM Districts (i.e., those that contain rangelands in Idaho; Table 3.2). Key-informants were identified through early conversations in several stakeholder meetings and the 2017 listening session (cite for key-informant sampling). We compiled an interview guide using notes from the listening session and multi-stakeholder meetings (Appendix A), as well as a series of press releases regarding outcome-based grazing and "grazing flexibility" from the national BLM office. The exploratory interviews included permittees, state and federal agencies, and nongovernmental participants. Interviews were designed to explore participants' perspectives on the articulated ideals of OBM and potential barriers and pathways for implementation of outcome-based approaches.

Memoranda were compiled by the lead author to reflect on shared and contrasting perspectives in the data, generate a list of emergent themes, and form hypotheses about institutional conditions that seemed relatively important for OBM implementation by BLM field staff and permittees (Charmaz, 2014). These syntheses, in addition to new policy developments such as the BLM's issuance of the "grazing flexibility IM" in 2018, informed our subsequent study design (see Table 3.1 for other developments). Prevalent themes identified in the exploratory interviews were

related to formalization, accountability, administrative discretion, and shared governance. These themes were discussed among authors and confirmed in follow-up conversations with select key-informants to advance working hypotheses (Miles et al., 2019). Following this, we developed an in-depth interview guide using literature on implementing innovations and co-management (e.g., Steelman, 2010 and Plummer and Fitzgibbon, 2004, respectively) to specifically explore these themes and hypotheses (Appendix A).

Between summer and fall 2019, participants were recruited from one field area in each of the Boise, Twin Falls, and Idaho Falls BLM Districts (see Wollstein et al., 2021 for details on field area selection and sampling). We conducted 25 in-depth, semi-structured interviews with BLM staff at participants' respective field offices. Of these, one individual had been interviewed in a 2018 exploratory interview. Interviews sought to capture if and how participants' understanding of OBM evolved (e.g., "When did you first hear about OBM? Has it changed how you do your job?"), what participants felt was socially, politically, legally, and/or administratively necessary for them to readily incorporate outcome-based approaches into permitting processes, and how and from whom they generally receive guidance on applying policies and regulations. The interviewer used probing questions to seek examples of learning taking place surrounding instances of implementation of OBM, particularly focusing on horizontal (i.e., between field offices) and vertical linkages (i.e., between field, district, and state offices).

Seven subsequent interviews were conducted via telephone with district and state, and national BLM staff due to COVID-19 restrictions in 2020. These interviews aimed to contextualize findings from the operational level and understand the intentions and processes behind new policy guidance received by field office staff. All in-depth BLM interviews were recorded except for two; participants did not grant permission and handwritten notes were instead taken. Audio recordings were transcribed verbatim for data analysis. Following the conclusion of interviews in each BLM office, analytic memorandums were produced by the lead author to begin to define codes and relationships among concepts to facilitate data analysis (Saldaña, 2015).

Documents were gathered for analysis throughout the study. They included publicly available materials from BLM's National NEPA Register (eplanning.blm.gov) such as Environmental Assessments for permit renewals and field areas' Resource Management Plans, as well as meeting notes, conference proceedings, and media content pertaining to OBM. These provided context for how initiatives developed and an understanding of the social and political environment in which OBM was unfolding.

Data Analysis

Data were analyzed iteratively during and after data collection using the analytic memorandums and qualitative induction to build theory. Memorandums were produced as a tool to reflect and expound upon the interview data as it was collected (Saldaña, 2015). This process, in addition to the 2018 exploratory interviews and review of the co-management literature, informed selection of a framework (described below) for provisionally coding the transcripts from the in-depth BLM interviews which guided subsequent analysis and theory development (Miles et al., 2019). Documents collected during data collection were used throughout data analysis procedures to triangulate interview data and create context to understand participants' perceptions of OBM and development of institutions.

First, the lead author employed a deductive approach using NVivo qualitative analysis software to trace characteristics and outcomes from Plummer and Fitzgibbon's (2004) conceptual framework of co-management in 20% of transcripts from the in-depth BLM interviews. This provisional coding and coauthor discussions were used to refine working hypotheses developed in analytic memorandums; we accordingly modified elements of Plummer and Fitzgibbon's framework to reflect preliminary findings. We created a coding guide to focus on references to legitimacy and learning, seeking to understand how characteristics from Plummer and Fitzgibbon's framework (i.e., agency of actors that can legitimate arrangements) intersect with them to produce co-management outcomes (i.e., structures, thus institutionalizing new practices; Table 3.3).

The lead author used the revised coding guide to conduct focused coding in NVivo of the in-depth BLM interview transcripts, seeking references to: (1) learning participants perceived to be occurring or is required, and (2) legitimacy of the arrangement, such as perceptions of actors' authority to undertake tasks and implement elements of OBM. For these instances, underlying co-management characteristics were also coded to analyze how they coalesced around our central research question, how structures and actors' agency contribute to or undermine the development and evolution of a new co-management arrangement (Charmaz, 2014; Corbin and Strauss, 2015).

Results

Through analysis of 32 in-depth interviews at operational, collective choice, and constitutional levels of Idaho BLM, we sought to understand the structures and ways in which actors' agency contributed to or stymied the development and implementation of OBM. We found that although documents, meetings, and press releases associated with OBM emphasized co-management characteristics such as transactive decision making and shared action, study participants involved in administering grazing permits (i.e., at operational levels) did not perceive the development of OBM to

mark a change in their administrative processes, available authorities, or actor roles. As a result, BLM staff who were applying elements of OBM had an outsized role in testing and defining the boundaries of OBM, transmitting lessons learned, and producing new institutions to legitimate OBM.

Input Legitimacy and Uptake

Because OBM was new and still taking shape, understanding how participants interpreted it was important in whether legitimacy was initially perceived that could then lead to learning, legitimation, and broad implementation of OBM elements in permitting. We found that nearly all interviewees at the operational level characterized OBM and associated messaging from higher levels of the BLM as a recitation of the ideals of adaptive management that lacked specific guidance for on-the-ground implementation and did not substantively address barriers to flexibility in grazing administration.

Most operational-level interviewees did not believe OBM concepts articulated in the 2018 grazing flexibility IM to be new, describing their impressions using words and phrases such as: "buzzword," "rebranding," "reinvigorate," "recirculating ideas," "reinventing the wheel," and "repackaging ideas." One interviewee reflected, *"It doesn't feel like anything different than what we should be doing as range managers"* (IF-OP-21). Another interviewee pointed to the emphasis of OBM on incorporating permittee knowledge, reflecting that BLM staff have always been required to do so:

> *We're certainly going to solicit input from the operator on how we make those changes and how do we make it work. Of course—gee whiz—we're bound by the regulations to consult, cooperate, and coordinate with affected permittees on proposed actions* (BOI-OP-01).

Operational-level interviewees also reported skepticism about OBM because ideas produced by the constitutional level (i.e., Idaho BLM and the national office) neglected to articulate to field office staff how to execute OBM-style permitting:

> *I would like to have the concept come inside [BLM field offices] and work through the strategy of, How we can do it? What, with our sideboards, can we legally do?…The idea of outcome-based grazing was running ahead of the policy* (BOI-OP-12).

Without changes to grazing regulations or National Environmental Policy Act (NEPA) requirements, many operational-level interviewees did not believe they had authority to implement many aspects of

OBM. In short, because OBM was received by field office staff as a "repackaging of ideas" that did not contain clear guidance or offer new authorities to navigate barriers, operational levels did not widely perceive OBM to legitimize their actions seeking to integrate greater flexibility in grazing permitting.

Learning and Legitimization of Actions

Because of a lack of clear guidance or new policies accompanying OBM, nearly all interviewees believed that learning would need to occur among BLM field office staff to develop an understanding of how to administer OBM-style permits without negatively affecting rangeland resources and also manage the vulnerability of proposed agency actions to public appeal. The know-how interviewees believed would be necessary to implement elements of OBM included learning how to situate OBM elements within current grazing regulations (e.g., writing terms and conditions, use of different authorities), and crafting NEPA documentation for outcome-based proposals that would not attract a public appeal or would be able to withstand legal scrutiny should aspects of a grazing permit be litigated.

Despite low initial perceptions of the legitimacy of OBM, we found some individuals within field offices were nonetheless experimenting with outcome-based approaches in grazing permit administration and transmitting lessons learned (see Wollstein et al., 2021). Our analysis found that operational-level interviewees' tactics fell into two categories: some individuals actively sought guidance from higher levels for adding flexibility to grazing permits and drafting NEPA documents, while others strove to make administrative adjustments that would not attract lawsuits. For the latter group, it was uncommon for district or other field offices to hear about the tactics and administrative tools used to integrate flexibility because, by design, they weren't controversial and were, therefore, not reported to higher levels of the BLM. In such instances, little knowledge-sharing occurred beyond the individual's own field office.

Nearly all interviewees described needing to learn to discern the actions that would leave the agency vulnerable to a successful lawsuit; interviewees intimated that this understanding would clarify the boundaries of OBM, legitimizing their actions. Learning occurred when individuals actively sought guidance from higher levels for incorporating elements of OBM into grazing permitting and their NEPA documents. These learning processes heavily relied on savvy field staff that possessed a sense for proposals that would be considered risky and those that would weather legal scrutiny. To facilitate learning, one assistant field manager was known for studying court decisions against the BLM Grazing Program to better understand what would be needed from staff in his field office to successfully implement changes in grazing permits, *"He looks at every single case*

nationwide. Why did we lose? Why did we win? And now we adapt our NEPA based on that" (IF-OP-08).

The potential for legal scrutiny of OBM was often cited as an impetus for learning through networks; the BLM's solicitor's office had a role in knowledge-sharing among field offices, particularly for crafting NEPA documents that would be litigated:

> *When [the lawyers] are looking at documents, they're going to retain what they learned in [the OBGA] and probably advise [other field managers] that here's what they did in [the OBGA] and it worked. They work with all the offices in the state, so they're going to be able to tie some of that stuff together. They're also going to say, "Don't do that. That didn't work in [another field office]"* (ID-CC-02).

Vertical linkages were evident when interviewees described developing their understanding and know-how for writing NEPA and integrating greater flexibility in permitting. One mechanism for clarifying the leeway for implementation was field managers transmitting what they believed were risk proposals to district or state offices:

> *A lot of times, when we have a permit renewal and we're looking at doing something [different], all of this information is usually floated up to the state office. District managers are talking to state directors about upcoming decisions* (ID-CC-04).

If this higher level determines that the proposed action was not reasonable or would not win in a court decision, then those proposals would be halted. There is also some effort at constitutional levels to aid local offices in understanding and interpreting new policies:

> *I try with our [district and field] offices to help them and recommend what's according to policy...We have a pretty good sense these days on what is adequate and what is kind of like, "Ooh, that would be a tough thing to defend." Because we've had to defend so many permit renewals the last 15 years or so we kind of have a decent sense* (ID-Con-02).

In contrast to our finding that vertical linkages were useful in building understanding for implementing OBM, we found less evidence of horizontal linkages being used for learning. At the operational level, different field offices even within a single BLM district may not necessarily be aware of what other offices have attempted. Because district managers often meet with field managers, district managers can facilitate horizontal linkages so learning can occur between field offices:

We try and share those experiences across the field offices to learn from that. Sometimes we're able if, for example, somebody in one field office has this experience with some project that we're putting in—maybe it's stream restoration—but it's in another field office and they don't have that experience we share staff or share that knowledge across the field offices and across the district. (ID-CC-03).

In instances where there are both vertical and horizontal linkages, lessons can sometimes be transferred from one situation to another. For example, a district manager urged the field offices in the district to use the NEPA from an OBGA permit as a template because it was upheld by a judicial ruling in 2019, *That document [NEPA for the OBGA] survived litigation and that should be looked at hard by another office or even within that office for a similar proposal* (ID-CC-02).

Taken together, we find collective choice and constitutional levels have a large role through vertical linkages in legitimizing actions which can then be implemented by operational levels, while field managers exercise discretion in evaluating the legal risk of new actions.

Legitimation Processes to Institutionalize OBM

Because we collected data during early development of OBM, few interviewees were able to provide specific examples of how engaging in OBM legitimized their actions. However, our analysis did reveal pathways participants believed would legitimate and eventually institutionalize OBM. Two pathways, in particular, were referenced: (1) formal guidance from high levels of the BLM, such as revised grazing regulations, regarding how to incorporate OBM principles into permitting and NEPA documentation, and/or (2) a court decision supporting the agency's proposed actions that include outcome-based elements would legitimate OBM. Importantly, changing norms within the BLM and the public concerned with grazing administration were both also recognized as essential.

Interviewees described needing to proceed cautiously to clarify the necessary administrative processes for OBM. Operational and collective choice levels described being strategic to gradually build legitimacy for incorporating OBM into agency processes, drawing on experience with other administrative tools available to the BLM:

> *I think there's a caution of not going a bridge too far and being the group whose project ends up being sued and loses and limits the opportunities that other offices might have…One of my [field] offices right now is looking at a project associated with one [categorical exclusion; CX]. And, as you might guess, our solicitor's office—like the BLM lawyers and a few folks—are very, very interested in helping us structure that because you don't want to be the person that uses the CX in a way that blows it up for everybody else…And I think with outcome-based grazing and like*

> *these new CXs we're seeing a lot of that. There's a lot of enthusiasm, a lot of interest. But there's also—for folks that have the institutional knowledge—a little bit of pragmatism and caution to ensure that we're getting started off in a way that positions us to be able to sustain these types of tools so we don't lose them.* (ID-CC-01)

Some interviewees believed the inclusion of OBM principles in field areas' Land Use Plans (LUPs) or Resource Management Plans (RMPs) would create supporting institutions they believed were necessary for field staff to implement OBM. They also recognized that alongside the production of new formal institutions, there would need to be a change in norms within field offices that would legitimize staff efforts to integrate flexibility:

> *[Flexibility] will be incorporated in new plans as they're prepared, but that's very slow. A lot of it is just how it takes a while to get into people's thinking. If they don't already have it in their thinking, they need to take it seriously and incorporate it into the things they say and do* (BOI-OP-15)

Some interviewees viewed these bottom-up processes as the path forward for OBM, in which successful experiences accumulate until it became a norm for field staff to administer flexible permits. However, we also identified difficulties related to the legitimization of actions through a bottom-up model; learning may be hampered and, thereby, limit legitimation. For example, some staff administering an OBGA or elements of OBM were reluctant to share what they felt were unnecessary details outside of their field offices because they did not want to attract the attention of potential litigants:

> *Interviewer: Do you think there will be other OBGAs in the future?*
> *ID-CC-02: Yeah, quietly. I think a lot of places are doing [OBM]…we don't really talk about it.*
> *Interviewer: Why do you think that is?*
> *ID-CC-02: Well, I think some of it is just trying to stay off the radar because of the litigation piece.*

Although this approach created localized instances of implementation, there was also broad agreement that if proposed actions aren't also validated by a judge (i.e., winning a lawsuit), the legitimization of actions under the IM or any new formal institutions such as LUPs will remain limited:

> *This [IM] changes nothing about my life until they redo the grazing regulations…I am excited that [higher levels of BLM] are open to the idea [of flexibility]. And I'm glad they're trying to move in that direction. But until we win in court, it almost doesn't matter (TF-OP-13).*

If know-how doesn't get shared with other offices and if it doesn't get litigated or stand up in court, then those actions aren't legitimized and do not, therefore, produce new institutions and the process legitimacy for widespread adoption.

Discussion

In the absence of formal co-management structures, initial perceived (input) legitimacy of OBM was low and we find, as a consequence, learning and legitimation were hindered by limited uptake or "quiet" OBM experiments seeking to avoid drawing either the attention of the public or higher levels of the BLM. Accordingly, the legitimation of OBM and this co-management arrangement is largely dependent on isolated instances of innovation by savvy field staff who use vertical linkages with higher levels to legitimize their actions as needed, and share knowledge learned from their local experiments through networks where horizontal linkages existed. As a result of engaging in co-management processes and sharing developed know-how, our study also finds that these local-level implementers were the primary drivers in the production of institutions in this arrangement, which enhanced output legitimacy. Thus, our study emphasizes the importance of the production of formal institutions to support legitimation processes. In particular, formal institutions were widely viewed by participants as a mechanism to legitimize their actions under OBM, essential for managing the BLM's risk of lawsuits from a public skeptical of grazing on public lands.

There are some benefits to less formal co-management arrangements like OBM (e.g., Hung, 2017). Relatively open scope rules—the "required, specific, or prohibited outcomes" of a governance arrangement (Heikkila and Gerlak, 2018)—can expand engagement and cross-scale interactions and enhance learning (Pahl-Wostl, 2009). Likewise, open choice rules give actors discretion to act, such as pursuing opportunities for experimentation (Heikkila and Gerlak, 2018). However, we find in our study that the external threat of frequent public appeals of federal grazing decisions act to restrict choice rules within the co-management arrangement. That is, the absence of formal guidance accompanying OBM resulted in the perception that implementation efforts may not be legitimate and, therefore, leave the BLM vulnerable to a lawsuit.

Some interviewees in field offices described incorporating elements of OBM into their grazing permitting in ways that would not be viewed as controversial by the public. Such instances

resemble what Abrams et al. (2015) and others have referred to as micro-processes of institutionalization. When these "quiet" experiments are successful and begin to aggregate within a field office, they may begin to be integrated into the field office's norms and cease to be considered risky or controversial (Bergsma et al., 2017; Bisschops and Beunen, 2018; see for example Wollstein et al., 2021). This shift in the informal institutional context can also legitimate OBM through the production of formal institutions, such as the field area's LUP. Micro-processes of institutionalization at operational levels illustrates benefits of strategically limiting stakeholder involvement in a co-management arrangement in an effort to stabilize networks or, as our example showed, test or clarify the boundaries of rule configurations (Sandström et al., 2014). However, these "quiet" experiments stymied opportunities for learning within the operational-level (i.e., among field offices) because they operated outside of horizontal and vertical networks.

Leadership has been widely recognized as essential in learning from taking risks and experimenting. Because transmission of know-how was essential to input legitimacy at operational levels, key actors in this arrangement were collective choice levels facilitating ensuring information-sharing among field offices, as well as between the solicitor's office at the constitutional level and field offices to aid in learning from successes around the state. Another role of the collective choice level in this arrangement was risk management; OBM-style permits that were viewed as potentially vulnerable were run by Field Managers or District Offices for guidance on proceeding. Because the collective choice level is linked with higher and lower levels, district managers could situate proposed actions from operational levels within larger social and political dynamics within the agency as well as the public (Carlsson and Berkes, 2005). Numerous co-management studies find that new arrangements are most successful when they are tied to existing structures for collaboration (e.g., Huitima et al., 2009; Sandström et al., 2014); new practices are more likely to be adopted when institutional workers relate them to existing structures and ideas that are already a part of the institutional landscape (Bisschops and Beunen, 2018; Van Assche et al., 2018). In our study, modeling OBM activities after existing practices in other field areas served to manage the risk of losing administrative tools, a concern mentioned by several interviewees.

Lastly, our study highlighted the importance of some initial formal institutions to support a new arrangement, especially when the costs of experimentation are perceived to be high; some formal guidance from high levels or the creation of new institutions, such as revised grazing regulations, were viewed as essential to creating input legitimacy local levels intimated would be necessary for them to implement OBM. Because high level guidance was perceived to be vague or absent, legitimization of actions instead occurred (or was expected to occur) through the institutional work of

some local-level implementers, and/or court rulings that would validate or clarify allowable activities. By seeing successful instances of implementation or the production of new institutions (e.g., OBM permits that survived judicial review), network actors' perceptions of the legitimacy of OBM practices are increased, potentially bolstering their confidence in adapting OBM practices themselves.

In short, where OBM was implemented at operational levels, we see two pathways through which legitimation did or could occur. The first is through micro-processes of institutionalization from the "quiet" experimenters inside field offices. The second is top-down, in which constitutional and collective-choice levels provide greater clarity on OBM, potentially producing formal institutions. Given these pathways, this arrangement primarily hinges on a few savvy staff trying it, experiencing successful implementation or having their actions clarified through judicial review or validated by higher levels, and sharing lessons. That is, a few individuals had or will have an outsized role in legitimating OBM. If these occur, then a transformation in norms and the creation of supportive institutions may follow.

Implications

Institutionalization of a new practice or arrangement requires substantial institutional work to transition from small experiments to wide acceptance within an organization (Bergsma et al. 2017; Bisschops and Beunen, 2018). This involves implementers persuading other offices to question their current routines and values (Plummer and Armitage; 2007). Actors at the collective choice level may be best positioned to do this work; in our study, they facilitated learning among field offices and transmitted higher level expectations.

This institutional work can also be difficult; many institutions are path dependent and deviating from norms is often viewed as costly. For example, in our study, actors at operational level who routinely prioritize lawsuit avoidance and minimizing legal risk may see the potential loss of administrative tools as too high of a cost for departing from local norms (Heikkila and Gerlak, 2018; Beunen and Patterson, 2019; Wollstein et al., 2021). To lessen these costs, we saw some institutional work being done at collective choice and constitutional levels to change norms surrounding the integration of flexibility into permitting through the construction of normative networks, that is, normatively sanctioning practices by sharing the practices of other field offices and encouraging replication of OBM-style permits that were validated by court rulings (see also Lawrence and Suddaby, 2006).

Our study offers insight into how new arrangements—even informal ones—can take shape and evolve through the institutional work of savvy individuals at the operational level. Because most

learning relied on actors at the collective choice level, creating formal institutions to codify OBM will ease the pressure on fragile linkages that almost entirely rely on these individuals (Pahl-Wostl, 2013). The production of formal institutions or a judicial ruling would legitimate and clarify the boundaries of OBM. Without the development of formal institutions alongside localized instances of OBM implementation and know-how shared through horizontal networks, legitimation of OBM and eventual institutionalization will be limited.

Acknowledgements

We gratefully acknowledge interviewees in the Idaho Falls, Twin Falls, and Boise BLM Districts as well as the Idaho and national BLM offices for their participation in this study. This research was supported by US Dept of Agriculture National Institute of Food and Agriculture McIntire Stennis projects (1019024, 1015330), a University of Idaho (UI) College of Natural Resources Curt Berklund Graduate Research Scholar Award, and a UI Office of Research and Economic Development Research Infrastructure and Scholarly Excellence (RISE) Graduate Research Fellowship.

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Tables

Table 3.1. Summary of OBM developments and research activities between fall 2017 and 2020. Table rows in grey indicate researcher activities. Abbreviations: Bureau of Land Management (BLM); Department of Interior (DOI); Idaho Rangeland Conservation Partnership (IRCP); Intermountain West Joint Venture (IWJV); outcome-based management (OBM); Outcome Based Grazing Authorization (OBGA); Society for Range Management (SRM).

Description of OBM development or research activity	Timing
Researchers gather documents, media reports, agency planning documents, judicial rulings pertaining to OBM; conduct participant observation at stakeholder meetings (e.g., SRM, IRCP)	Throughout study
Researchers convene Idaho stakeholder group conference calls	Fall 2017
BLM solicits proposals for OBGA pilots	Fall 2017
Researchers host OBM listening session for Idaho stakeholder group	Winter 2017
BLM announces 11 OBGA pilot projects in six western states	Spring 2018
Researchers develop preliminary interview guide and key-informant contact list using information from listening sessions and BLM press releases	Spring 2018
IWJV hires OBGA Coordinator to work with BLM, permittees	2018
Researchers conduct exploratory interviews with key-informants in six BLM field areas	Spring, summer 2018
BLM releases “Grazing flexibility” IM; provides guidance on OBM-style permitting	Fall 2018
Researchers synthesize findings from exploratory interviews; refine research questions and study design	Fall, winter 2018
Members from Idaho stakeholder group establish IRCP (funded by BLM/IWJV); priorities include outcome-based land management and building a learning network	Fall 2018
Researchers conduct in-depth interviews with BLM field office staff in 3 BLM districts	Summer 2019
Partners in the Sage (BLM/IWJV) launch an OBGA communications landing page	2020
DOI Budget Justifications and Performance Information for the BLM include references to outcome-based grazing	2020, 2021
Researchers conduct in-depth interviews in BLM district and state offices to validate findings, ascertain interpretations	Summer 2020
Researchers summarize interviews in analytic memorandums to prepare for data analysis	2020

Table 3.2. Summary of number of interviews conducted for each interviewee category between 2018 and 2020.

Interviewee category	Number of interviews
Exploratory interviews (2018)	
BLM	7
Permittee	16
Other agency, NGO	4
Total	27
In-depth BLM interviews (2019, 2020)	
Operational (field offices)	25
Collective choice (district offices)	5
Constitutional (state, national offices)	2
Total	32

Table 3.3. Codebook developed following first round of coding in-depth interviews with BLM staff. Characteristics, outcomes, and descriptions adapted from Plummer and Fitzgibbon, 2004; Carlsson and Sandstrom, 2005; Armitage et al., 2007; Berkes, 2009.

Category	Theme/code	Description
Co-management characteristics	Communication, negotiation	Producing shared understanding through dialogue and deliberation
	Transactive decision-making	Using multiple knowledge types and actor dialogue to make decisions
	Learning	Developing strategies, acting, reflecting
	Shared action/commitment	Undertaking agreed-up actions; facilitated by leadership and shared vision
	Linkages	Information sharing among actors within (horizontal) and among governance levels (vertical)
Co-management outcomes	Legitimization of actions	Enhanced credibility of objectives or actor roles
	Transformational learning	Change in understanding, practices, norms; actors transfer learning to new situations

Figures

Figure 3.1. Conceptual figure of co-management continuum. Arrangements range from informal to formal. Legitimation and institutionalization are driven by iterative and nonlinear institutional work and learning that occurs.

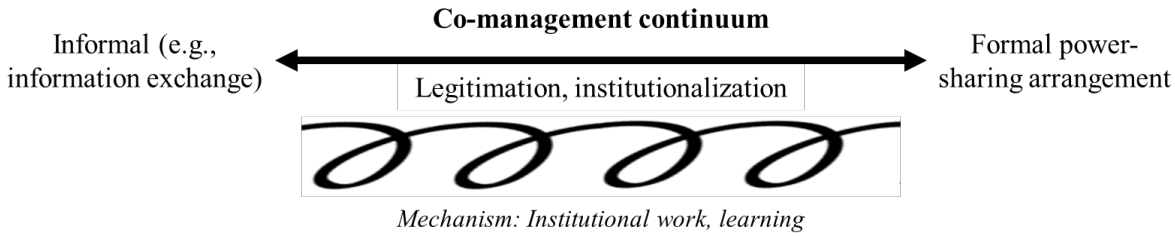
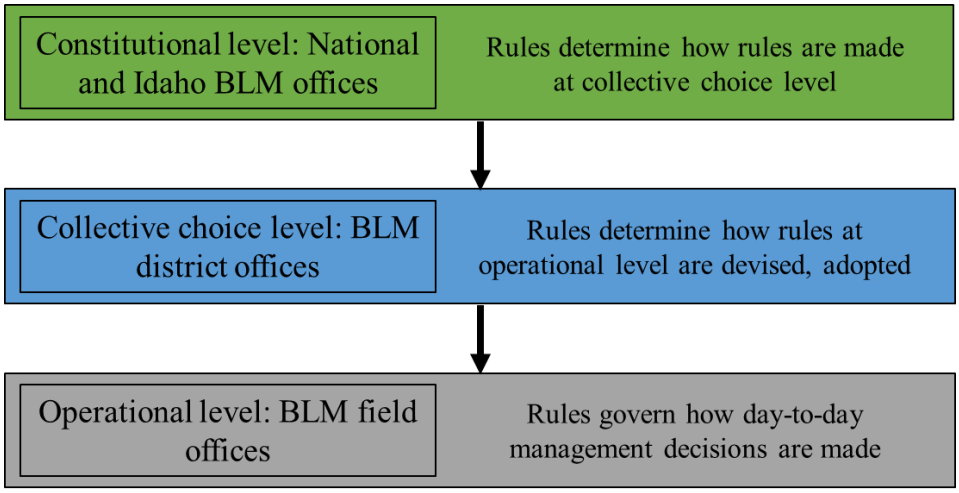


Figure 3.2. Hierarchal governance scales used for institutional analysis informed our study design (Ostrom, 1990). BLM is the Bureau of Land Management.



Chapter 4: Integrating Rangeland Fire Planning and Management: The Scales, Actors, and Processes

In review: Wollstein, K., Johnson, D.D., in review. Integrating rangeland fire planning and management: The scales, actors, and processes. Rangeland Ecology & Management.

Abstract

Research continually adds to our understanding of the ecological factors and biophysical processes driving frequent, large-scale fires on Great Basin rangelands. Yet even with advances in forecasting rangeland fire probabilities and likely ecological outcomes of fire, it remains difficult for individuals, communities, or organizations to coordinate their actions across jurisdictions and at an ecologically-relevant scale to address collective wildfire risk. In this forum, we discuss current institutional arrangements that perpetuate scale mismatches in this system; that is, institutional objectives, authorities, and capacities that limit coordinated actions to mitigate collective wildfire risk. We make a case for fireshed-scale coordination via Fireshed Councils, a rangeland and fire planning and management unit that has both biophysical and social relevance to individuals and organizations engaged in fire risk mitigation. A Fireshed Council offers a venue for diverse group members to mix and match their respective rules and tools to navigate institutional barriers and capacity challenges in new ways. Operating in a collective arrangement at this scale aims to ensure that an individual or entity's activities transcend traditional modes of planning (i.e., parcel-scale), complement concurrent management activities, and translate to long-term ecosystem resilience to fire. Fireshed Councils will require resources and support from high governance levels for sustainability and legitimacy, and relative autonomy to determine how best to support local needs.

Introduction

Large-scale wildfires in the northern Great Basin (i.e., > 400 ha; Smith et al., in press) are increasing in frequency, underlining the need for new, strategic approaches to rangeland and fire planning and management. Research continually adds to our understandings of the ecological factors and biophysical processes driving these trends (e.g., Holmgren et al., 2006; Abatzoglou and Kolden, 2013; Balch et al., 2013; Coates et al., 2016; Pilliod et al., 2017; Bradley et al., 2018), as well as social conditions and policy configurations that may enable effective responses (e.g., Stasiewicz and Paveglio, 2017; Abrams et al., 2018; Meredith and Brunson, 2021; Wollstein et al., 2021). Yet even with advances in forecasting rangeland fire probabilities and likely ecological consequences of fire

(e.g., Smith et al., in press; Chambers et al., 2014), it remains difficult for managers to identify, prioritize, and then engage in coordinated activities that will mitigate fire risk at a meaningful scale and, importantly, promote long-term ecosystem resilience to fire (Charnley et al., 2020; Wollstein et al., 2022a).

Recent advances in fuels-based wildfire probability modeling using remotely sensed data show promise for informing wildfire risk mitigation and wildfire preparedness within the Great Basin (e.g., Bradley et al., 2018; Jones et al., 2021; Smith et al., in press). Data and tools that can inform the probable ecological outcomes of rangeland fire also exist or are in development (e.g., Chambers et al., 2014; Miller et al., 2013; Miller et al., 2015; Barker et al., 2019; Creutzburg et al., 2022). Efficacies of fuels treatments with grazing and other tools to influence wildfire probability and fire behavior have also been extensively investigated (e.g., Diamond et al., 2009; Pyke et al., 2014; Davies et al., 2015; Davies et al., 2017; Clark et al., in review; Thomas and Davies, review). Taken together, there is abundant science-based information available to support managers' decisions to reduce wildfire risk and improve ecological outcomes of fire. However, using this science to then implement appropriate activities on the ground in a relevant timeframe and at meaningful scales is an entirely different challenge (Li et al., 2020; Wardropper et al., 2021).

In this forum, we examine these difficulties in planning and implementing management activities in response to emergent information regarding wildfire risk conditions. We contend that rangeland and fire planning and management currently operate at spatial, temporal, and jurisdictional scales that limit effective engagement in collective actions to address the occurrence of frequent, large-scale wildfires (Cash et al., 2006; Cumming et al., 2006). We posit that challenges stem from governance institutions that cannot accommodate uncertainty inherent in rangeland systems, differences in objectives between rangeland and fire management institutions despite the interrelated nature of the issues, and planning and implementation processes that do not necessarily occur at the right scales and with the right actors (i.e., individuals, communities, or organizations). Drawing on principles of Community-Based Natural Resource Management and examples from rangeland and fire management in southeastern Oregon, we propose social and biophysical variables to advance an applied concept for integrating rangeland and fire planning and management at a scale that is relevant for managing large-scale wildfires on Great Basin rangelands. We conclude by offering a Fireshed Council model for rangelands that may transcend traditional modes of planning and management and allow different actors to coordinate their actions in an effective collective arrangement (i.e., a "right" scale).

Challenges with Mobilizing Preemptive fine Fuels Management

There is great potential for using recently developed wildfire probability forecasting information to support strategic management decisions aimed at preemptively reducing wildfire risk. Annual herbaceous biomass production models can inform where to strategically deploy targeted livestock grazing to reduce fine fuels (see Maestas et al., in review). However, wildfire risk in the Great Basin is highly dynamic across space and time (Smith et al., in press); it is challenging in this setting for multiple individuals or organizations (e.g., rangeland and fire managers, livestock grazing permittees) to mobilize a timely response to emergent information.

Addressing frequent, large-scale wildfires is also a collective action problem in which the actions (or inaction) of multiple actors contribute to the occurrence and outcomes of wildfire in mixed-ownership landscapes that often include a diversity of values, management objectives, and interests (Paveglio et al., 2019; Charnley et al., 2020). Landowners within a fire-prone area are interdependent because the likelihood of a parcel burning in a wildfire is both a function of the site condition as well as conditions of neighboring parcels (Busby et al., 2012; Hamilton et al., 2019; Charnley et al., 2020). That is, if one land manager neglects to mitigate fire risk on their own jurisdiction, multiple individuals at a larger spatial scale have a greater potential to experience adverse effects of fire. For example, untreated invasive annual grasses increase the likelihood that an ignition will propagate a fire and that subsequent fires will be more frequent (Balch et al., 2013). This can further annual grass dominance and expansion onto neighboring parcels—elevating collective risk (Epanchin-Niell et al., 2009). In this, herbaceous fine fuels management at smaller spatial scales is linked to wildfire risk and ecological resilience at larger spatial and temporal scales.

Below, we describe scale mismatches created by current governance arrangements for rangeland and fire management, gaps and overlaps in institutional authorities, capacities, and objectives ("rules and tools"), and limitations of the scales at which actors and institutions operate. Scale mismatches manifest when governance institutions (i.e., rules and norms) or management actions do not "map coherently on the biogeophysical scale of the resource, either in space or time" (Cash et al., 2006, p. 8). Scale mismatches are especially persistent where there are multiple jurisdictions with different rules, culture, and norms, across which actions must be coordinated to mitigate collective wildfire risk. In examining scale mismatches and limitations in mixing and matching actors' rules and tools, we articulate a need for integrated work at an appropriate scale for coordinating and sustaining collective actions to mitigate fire risk.

Scale Mismatch: Ecological Uncertainty over Space and Time

Rangelands are characterized by varying wildfire risk probabilities over space and time. The northern Great Basin, in particular, presents highly dynamic interannual fire risk conditions primarily driven by weather patterns and herbaceous fine fuel accumulation (Pilliod et al., 2017; Smith et al., in press). The ecological outcomes of wildfire also vary over space and time with pre-fire biotic conditions and along environmental gradients that influence resistance to annual grass invasion and resilience to fire (Chambers et al., 2014). Maestas et al. (in review) call for using fuels-based rangeland fire probability forecasts "…to target the right actions, in the right places, at the right time to reduce risk of large fires in the Great Basin" (12). But the inherent variability in fire risk and recovery potential in this system complicates planning and implementing such an approach because the same practices to achieve desired outcomes cannot be applied in the same way in every location and in every year (Boyd and Svejcar, 2009).

Furthermore, a spatial scale in the context of rangeland management may be a single pasture, a grazing allotment comprised of multiple pastures, a ranch operation using a combination of private land and allotments for livestock forage needs, or a landscape supporting multiple ranching operations. It is notable that as spatial scale increases, so does the complexity of social-ecological interactions (Cash and Moser, 2000; Cumming et al., 2006; Termeer et al., 2010); spatial scales intersect with temporal ones including livestock rotations, growing seasons, or periods of elevated fire risk. Processes occurring at large spatial scales are also likely to overlap with jurisdictional scales and their associated institutions, such as timing of grazing on state and federal allotments stipulated by the terms and conditions of a livestock grazing permit (Robinson et al., 2017).

Grazing allotments and pastures are used at different times—within and among years—and each potentially contain different levels of wildfire risk at different places and different times depending on management history and other biophysical conditions (Fuhlendorf et al., 2017; Mitchell et al., 2017; Barker et al., 2019). There is a scale mismatch when the ecological system requires adaptive, nimble responses to new information about wildfire risk, while administrative processes or a livestock operation cannot easily be adjusted to accommodate emergent needs (Allen et al., 2017). For instance, if the application of grazing to address fine fuels accumulation exceeds the number of Animal Unit Months (AUMs; the amount of forage needed to sustain one cow, five sheep, or five goats for 1 mo) authorized on a federal livestock grazing permit, then seasonal livestock grazing to respond to elevated fire risk is essentially an unusable tool until the permit's terms and conditions are revised to reflect the new need (Wollstein et al., 2021). Similarly, the Bureau of Land Management's (BLM) grazing regulations provide for "biological thinning" for the purpose of fuels reduction and

mitigating the risk of wildfire (43 CFR 4190.1(a)(1)). But use of this administrative tool requires infrastructure and a livestock operation able to efficiently deploy grazing animals and at different places in different years (Davies et al., 2022).

Scale Mismatch: Different "Rules and Tools"

A single administrative unit within the Great Basin, such as a BLM District, often contains several jurisdictions (e.g., private, state, other federal, and Tribal lands). In each jurisdiction, there are different actors with different roles, responsibilities, rules, culture, and norms (Robinson et al., 2017; Aslan et al., 2021; Wollstein et al., 2021, Cyphers and Schultz 2019; Davis et al., 2021; Paveglio 2021), which complicates the execution of collective actions across boundaries (e.g., Epanchin-Niell et al., 2010; York and Schoon, 2011; Paveglio et al., 2019; Charnley et al., 2020). Davis et al. (2021) term this "parallel play," in which individuals, communities, or organizations would ideally coordinate their actions to mitigate collective wildfire risk, yet are constrained by rules pertaining to how they can combine and apply their respective resources, authorities, and processes.

Resources, authorities, and processes are reflections of actors' different management objectives or roles, which may vary within a jurisdiction or even within an organization (Davis et al., 2021). The BLM's Rangeland Management Program (the "Range Program," hereafter) is tasked with managing public rangelands for multiple uses and values, while the BLM Fire Program is focused on wildland fire and fuels management operations to protect the public, natural landscapes, and other values (BLM, 2021). As a result, the Programs have different budgets, planning processes, disciplinary staffing, timelines, and tasks they undertake to support their respective objectives—making it difficult to coordinate management even within the same project area (see also Cyphers and Schultz, 2019).

Differing institutional rules and tools can also create mismatches in the spatial and temporal scales at which tasks are undertaken by each entity. For example, the Range Program largely completes planning and management at the allotment scale. While this may be the best for fulfilling the Range Program's objective to provide for livestock grazing while ensuring rangelands are sustainably used, this approach may neglect to account for how the effects of allotment-scale activities aggregate at other spatial, temporal, and jurisdictional scales. In this, the Range Program's prevailing scale for rangeland administration may limit the BLM's ability to coordinate management among parcels and other ownerships to synergistically influence fire behavior and outcomes at larger spatial scales (Wollstein et al., 2022a).

Furthermore, different aspects of an agency or Program's objectives receive different resources or are subject to different authorities and processes. BLM's fire response, in particular, occurs within a highly formalized system coordinated at the national level (i.e., the National Interagency Fire Center) to provide for firefighter safety, allocate resources, and protect human lives and values (Steelman, 2016; Wollstein et al., 2022b). In contrast, fuels treatments or post-fire rehabilitation are typically planned and implemented by local BLM staff, agency partners, and non-governmental actors (Meredith and Brunson, 2021). Thus, even within an agency, those responsible for fire response do not necessarily plan or coordinate with managers associated with fire risk mitigation (Fischer et al., 2016). Steelman (2016) refers to this as the "siloization of suppression activities," in which fire response is funded, planned, and executed separately from fire risk mitigation. As a consequence, those responsible for fire response and mitigation may each lack complete information about the larger spatial and temporal context or effects of their respective activities (Aslan et al., 2021; Davis et al., 2021).

Private landowners also have their own set of management objectives, constraints, and expectations (e.g., Abrams et al., 2017; Wollstein and Davis, 2017). Rangeland Fire Protection Associations (RFPAs) have offered an expanded role for private landowners in rangeland fire response. RFPA members are authorized to provide initial attack on wildfires on BLM and state lands in remote areas of southeastern Oregon and southwestern Idaho (Abrams et al., 2017, Davis et al., 2020). RFPA members are primarily ranchers, who are uniquely invested in wildfire risk reduction across private landholdings as well as public lands to protect leased forage (Abrams et al., 2017, Stasiewicz and Paveglio, 2017) and promote the long-term viability of their operations (Wollstein and Davis, 2017). Although fire response activities can yield beneficial ecological effects (e.g., protection of low resilience rangelands from conversion to invasive annual grassland; Creutzburg et al., 2022), strategic pre- and post-fire management can have comparatively outsized effects on rangeland fire outcomes (e.g., pre-fire grazing treatments can reduce burn severity and, thereby, decrease the risk of post-fire annual grass invasion; Davies et al., 2010).

Yet RFPA members have limited authority to engage in wildfire risk mitigation activities off the fireline and beyond the boundaries of their private lands (Abrams et al., 2018). If a rancher is concerned about an accumulation of fine fuels on their BLM grazing allotment, they lack authority to apply treatments because their use of the allotment is overseen by the BLM Range Program, which has limited flexibility to authorize fuels treatments through a grazing permit (see Wollstein et al., 2021). On private lands, RFPA members may enact wildfire risk reduction such as treating annual grasses with targeted grazing or herbicides and cutting western juniper (*Juniperus occidentalis*). But

this work may strain their financial capacity and if adjacent ownerships do not also engage in wildfire risk reduction, the effects on fire occurrence and outcomes will be limited.

In summary, different actors are subject to different rules and have available to them different tools to achieve their respective objectives. This is best encapsulated by how grazing to manage fine fuels may be implemented by different actors: private landowners may apply grazing wherever they judge is appropriate on their private landholdings, but do not have authority to do so on any allotments associated with their ranch outside of the terms and conditions of their permit (e.g., they cannot apply grazing outside of dates specified on the permit). BLM's Range Program administers grazing on BLM lands through a system of grazing permit authorizations to ensure that rangeland resources are managed for multiple uses and values. The stipulations of grazing authorizations may or may not align with ecologically-relevant timeframes and fire risk conditions. Although livestock grazing is a tool available to BLM's Fire Program to manage fine fuels and meet Program objectives, authorizing its application may require case-by-case or programmatic approval under the National Environmental Policy Act (NEPA).

Scale Mismatch: Institutions and Norms

Lastly, different actors involved in rangeland and fire management may each have their own norms, culture, and unwritten rules that guide their actions (Schlager and Cox, 2018). Although the BLM Range Program administers grazing, a widespread tool for managing herbaceous fine fuels, if norms are such that the Fire and Range Programs do not communicate or readily work together through one another's respective planning processes, it is possible that those responsible for rangeland management will not coordinate their activities with those responsible for fire and fuels management, and vice versa. Even if the Fire Program has secured authorization to use livestock as a biological control to address fine fuels and reduce the impact of wildfire, if BLM fuels managers are not accustomed to working with grazing permittees, it is unlikely that they will seek them out to aid in implementing fuels management treatments (Wollstein et al., 2021). Furthermore, Wollstein et al. (2021) found some BLM field offices in Idaho perceived NEPA requirements to be a barrier to adaptively addressing wildfire risk due to potential for attracting attention from a litigious public opposed to grazing on public land. As a result, Fire Program personnel may instead focus on implementing brush management or herbicide treatments to control invasive annual grasses, given that there are perceptions of fewer implementation barriers associated with such practices.

In short, it is difficult for actors associated with rangeland and fire management to coordinate or combine their rules and tools. First, different individuals and organizations have different objectives guiding both the types of activities they undertake as well as the scales at which they plan

and operate. Second, they each have different authorities and abilities to act that may or may not overlap on a landscape. Lastly, culture and norms may facilitate or prevent actors from working together. This culminates in difficulties getting the right combinations of actors, resources, and authorities to engage in collective actions at relevant scales to promote long-term ecosystem resilience to fire.

Navigating Scale Mismatches: What are the Scales, Actors, and Processes?

Addressing dynamic, persistent problems requires sustained collective actions at meaningful scales and the ability to adaptively implement those actions in response to new information (Brunson, 2012). Because wildfire risk mitigation (or not mitigating) influences the occurrence of fire and future ecological conditions at much larger spatial and temporal scales than individual management actions, rangeland and fire planning and management must occur at scales beyond those of individual parcels. To enable coordination of the different authorities, capacities, and actors' roles surrounding this issue (i.e., overcome "parallel play,"), rangeland and fire planning and management must be integrated and aligned in promoting long-term ecosystem resilience to fire.

Integration of planning and management will require developing adaptive institutions and coordinating activities among multiple jurisdictions and actors at a relevant scale (Steelman, 2016; Davis et al., 2021). To this end, we offer considerations for defining the scales at which this work should occur using social and biophysical boundaries. We extend a firesheds concept to one adapted for rangelands settings, where communities are spatially extensive and fire occurrence and outcomes are intertwined with local economies, jurisdictional scale, and site-specific resilience and resistance. Lastly, we propose a new framework for coordination, Fireshed Councils, and describe how they may function and build upon existing rangeland and fire management institutions in Oregon.

Defining a "Right" Scale

Although there is not a perfect scale for matching governance institutions to an ecological system (Cash et al., 2006; Folke et al., 2007), we suggest that the geographic extent of an integrated rangeland and fire planning unit must make sense from a fire management perspective as well as include relevant rangeland actors for information-sharing and capacity-leveraging to support long-term ecosystem resilience to fire. The latter necessitates reorganizing current institutional arrangements within a unit that reflects existing social dynamics and motivations (Paveglio et al., 2019).

Decentralizing decision-making to local communities can enhance participation from non-governmental entities, integrate local knowledge, and empower local actors (Lemos and Agrawal,

2006; Lurie and Hibbard, 2008). In such arrangements, tasks are ideally allocated to the lowest scale (i.e., governance level) where individuals and organizations possess the capacity to act (Marshall, 2008; Marshall and Stafford Smith, 2010). However, if decisions are made too locally, it may be difficult for managers to situate their decisions or coordinate activities that occur on individual allotments or private parcels within a more relevant spatial and temporal scale (Cash et al., 2006; Marshall, 2008; Wyborn and Bixler, 2013). While higher levels ideally provide sustained investment and support for coordination and on-the-ground work (Cash and Moser, 2000; Curtis et al., 2002; Vermunt et al., 2020), it is essential that the unit has autonomy to decide how to go about meeting higher-level objectives (Marshall, 2008; Wollstein and Davis, 2020). Thus, the "right" scale for the purposes of this article is embedded within a supportive framework, adequately resourced, and networked with other similar units for information-sharing and learning.

Regarding the matter of geographic extent, a "firesheds" concept has been advanced by the USDA Forest Service and in the wildfire governance literature for forestlands and Wildland-Urban Interface communities (e.g., North et al., 2012; Ager et al., 2015; Kline et al., 2015; Ager et al., 2019). A fireshed is a grouping of areas with similar fire regimes, fire history, and wildfire risk. These are refined through simulations of where fires are likely to ignite, their extent under given time periods, and potential effects on valued resources (Collins et al., 2010; Thompson et al., 2013; Scott and Thompson, 2015). A fireshed is conceptually useful in terms of delineating the biophysical scale at which fuels treatments may modify landscape-scale fire behavior (e.g., size, severity, and what burns). In rangeland settings, additional biophysical delineations that may define a planning unit include anthropogenic or natural landscape features that act as substantive barriers to fire spread (e.g., major roads and major water bodies; Wollstein et al., 2022b).

Although firesheds offer a useful concept to inform the geographic extent of a rangeland and fire planning and management unit, it presupposes that actors within an area defined by fire simulation modeling have the knowledge, willingness, or capacity for ongoing coordination of actions to mitigate fireshed-wide risk. In much of the Great Basin, residents are spatially dispersed and communities are not defined by mere proximity. Rather, communities are the stakeholders who understand wildfire risk and are socially inclined to work together in an area to promote their values at risk (Paveglio and Edgeley, 2019; for examples, see Toledo et al., 2014, Stasiewicz and Paveglio, 2017; Davis et al., 2020). In rangeland settings, this may come from experiential knowledge or social memory of wildfire, and may be motivated by a shared economic interest in preventing wildfires (Toledo et al., 2012; Abrams et al., 2017). RFPA boundaries are an example of these principles in practice. Boundaries are initially proposed by landowners with an interest in preventing large-scale

wildfires within a geographic area; informed by local knowledge of the land, resources, and fire behavior; existing social networks (i.e., "neighbors helping neighbors"; Abrams et al., 2017); and adjusted for physical barriers on the landscape (M. Vetter, personal communication 6 Oct 2021).

Boundary designations of a rangeland and fire planning and management unit must have both biophysical and social relevance to those engaging in fire risk mitigation. A rangeland fireshed unit must operate at a governance level that enables actors to mix and match their rules and tools in new ways to navigate administrative, cultural, and capacity challenges. RFPAs have emerged at a geographic scale that is large enough to effectively respond to wildfires, yet localized enough to engender the reciprocity and cooperation required to enable coordinated fire response (Abrams et al., 2017; Davis et al., 2020). However, current RFPA authority is centered solely on fire response and coordinated almost exclusively with the BLM Fire Program's suppression functions. Thus, rangeland firesheds are necessary units in which an individual or entity's activities transcend the scale of a single allotment or parcel and complement concurrent management activities to meaningfully influence fire outcomes and improve ecosystem resilience to fire. Below, we propose an institutional framework to support this need.

Integrating Planning and Management through Fireshed Councils

The local social context, in addition to biophysical conditions that affect rangeland wildfire occurrence and outcomes, provides the logic for a scale at which it makes sense for actors to work together on an expansive landscape. The shared desired outcome of long-term ecosystem resilience to fire creates a common sense of purpose, even where individuals' values diverge (Paveglio et al., 2019). Current institutions must therefore be rearranged so capacity and resources can be directed at coordinating the multiple authorities and roles of actors at this scale to advance a shared vision (Cyphers and Schultz, 2019; Kelly et al., 2019; Charnley et al., 2020; Davis et al., 2021). To support these needs, we propose the formation of Fireshed Councils, a governance arrangement similar to Watershed Councils.

Watershed Councils, a formally-recognized unit in the U.S. West since the early 1990s, are community-based nonprofit organizations consisting of governmental and nongovernmental stakeholders who collaborate to address water and other natural resources issues at the scale of a watershed (Griffin, 1999). Watershed Councils have been documented to be effective for integrating local knowledge into decision processes, creating rules for resource use to better reflect local needs, and nurturing experimentation (Curtis and De Lacy, 1995; Curtis et al., 2002; Flitcroft et al., 2009).

Fireshed Councils would similarly provide a venue for actors to coordinate typically disparate wildfire risk reduction activities within the boundaries of the fireshed. Because the fireshed's boundaries would be partially defined by actors with shared interests and already inclined to work together to mitigate wildfire risk, the Fireshed Council would differ from other collaborative arrangements focused on consensus-building among diverse values. By definition, Fireshed Council members agree upon a problem and share a vision for ecosystem resilience to fire; the group would therefore primarily serve to coordinate planning and implementation among different jurisdictions and actors within the fireshed.

Sustained interactions for group learning and trust-building within the Fireshed Council may allow members to communicate a need or discuss mixing and matching rules and tools in complementary and novel ways within the fireshed. For example, the Fireshed Council may agree that protecting intact areas of the sagebrush ecosystem with low resistance to invasion and resilience to fire is a priority within the fireshed, as not doing so may lead to more large-scale fires and negatively affect overall ecosystem resilience (Creutzburg et al., 2022). Therefore, the BLM Fire Program's activities may include implementing strategic fuel breaks to improve wildfire response to protect those areas, and the BLM Range Program may work with grazing permittees to apply grazing to areas with high accumulation of fine fuels (see Wollstein et al., 2022a). However, it is important to acknowledge that learning and communication alone cannot overcome some institutional barriers to adaptive management approaches (Wollstein et al., 2021). Some internal negotiation or new institutions will be required for organizations such as the BLM to overcome "siloization" and better capitalize on opportunities for grazing administration and fuels management to be complementary.

In the long-term, Fireshed Councils may create an environment for long-term solutions, adaptation in the face of change and uncertainty, and a culture of learning among rangeland and fire managers. However, the nimble deployment of grazing to support a Fireshed Council's objective of long-term ecosystem resilience to fire will also require an administrative environment that can accommodate adaptive management. The BLM may consider integrating decision-support products and thresholds into NEPA analyses; if fire probability maps (e.g., the Rangeland Analysis Platform's fuels-based maps; Smith et al., in press) routinely indicates areas within the fireshed with higher mean fire probability, a change to the terms and conditions of a livestock grazing permit may be warranted to ensure that grazing is applied during the most ecologically-relevant period and at an intensity so to influence fire probability and fire behavior. Additionally, NEPA requires an analysis of the cumulative effects of a proposed action, such as grazing, on rangeland resources. Information shared

through a Fireshed Council may better situate how such a decision affects the fireshed as a whole and how its effects may aggregate over time.

Lastly, for Fireshed Councils to be fully institutionalized, the new unit must receive recognition and support from higher levels to be perceived as legitimate by local participants and sustained in the long-term (Lane and McDonald, 2005; Vermunt et al., 2020; figure 4.1). To address deteriorating watersheds and loss of endangered salmon habitat, the establishment of the Oregon Watershed Enhancement Board (OWEB) provided Watershed Councils crucial funding and support for coordination (Lurie and Hibbard, 2008; Chaffin et al., 2015). While OWEB bolstered planning capacity and the legitimacy of Watershed Councils (Lurie and Hibbard, 2008), higher-level requirements for activities undertaken by Watershed Councils can limit the benefits of a community-based model (Curtis et al., 2002; Lurie and Hibbard, 2008). The Sage Grouse Conservation (SageCon) Partnership's coordination efforts in Oregon to preclude listing of the greater sage-grouse (*Centrocercus urophasianus*) under the Endangered Species Act in 2015 may offer insights into configurations for higher-level support for Fireshed Councils. SageCon coordinated policy and management across the sagebrush ecosystem in Oregon by providing a forum for lower levels (e.g., Soil and Water Conservation Districts) to develop local programs that would incentivize voluntary conservation by private landowners and also align with higher-level U.S. Fish and Wildlife Service requirements for a non-listing decision (Wollstein and Davis, 2020). Importantly, legislation and state and federal funding furthered perceptions of legitimacy of the arrangement.

There are limitations to our proposed Fireshed Council model. First, the existence of a Fireshed Council does not in and of itself empower local actors. Ongoing high-level recognition and support will be essential (Lane and McDonald, 2005; Hibbard and Lurie, 2008; Chaffin et al., 2015). Second, although Fireshed Councils would ostensibly offer local control or co-management, validation of this new institutional arrangement would depend on the Fireshed Council's ability to foster productive discourse, navigate administrative challenges, and provide long-term coordination (Habron, 2003). Securing participation will also be challenging, especially if potential group members do not feel the plans are salient or inclusive (e.g., Kusters et al., 2018; Vermunt et al., 2020). Lastly, Fireshed Councils are not a panacea for this complex problem; some problems require other or complementary approaches at other governance levels (Cohen and Davidson, 2011).

Conclusion

Although strategic application of grazing to reduce fine fuels and influence fire probability and behavior is supported by research (e.g., Diamond et al., 2009; Davies et al., 2015; Thomas and Davies, in review) and adaptive management decisions will potentially be better informed by pre-

season fire probability maps advanced by Smith et al. (in press), complex and overlapping authorities, resources, and capacities can create barriers to broadscale implementation of grazing for fuels reduction purposes. Currently, scale mismatches including different authorities, resources, and capacities ("rules and tools") associated with rangeland and fire institutions limit collective actions to address rangeland wildfire risk. An era of frequent, large-scale rangeland wildfires demands coordination of relevant actors and processes at biophysically- and socially-relevant scales as well as the ability to mix and match rules and tools for addressing fine fuels accumulation across multiple scales. Thus, new institutions are necessary so capacity and resources can be directed at coordinating the multiple authorities and roles of actors to advance a shared vision.

We proposed an institutional framework, Fireshed Councils, in which different members' authorities, resources, and capacities may be synergistic and coordinated to be applied in novel ways to promote long-term ecosystem resilience to fire. Fireshed Councils must have the support from higher-levels of governance, articulating objectives and providing resources and coordination, while lower levels have the discretion to implement in ways that reflect local conditions and needs. In concert with this, enabling policies are necessary for using adaptive management bolstered by tools such as fire probability maps. Coordination and communication between the Range and Fire Programs of the BLM as well as private landowners and other relevant stakeholders will ease logistical barriers such as deploying livestock in an ecologically relevant timeframe.

The Fireshed Councils concept is an effort to advance integrated rangeland and fire management planning and implementation at biophysically- and socially-relevant scales. Yet challenges associated with this model include securing long-term commitment to active participation from relevant stakeholders, overcoming institutional inertia associated with entrenched funding and planning procedures and modes, and securing new or redistributing existing capacity and resources to support coordination of activities for a novel planning unit. Despite these challenges, we submit that new rangeland and fire planning and management institutions will support the actors, capacities, and processes that will promote long-term ecosystem resilience to fire in a complex social-ecological system.

Acknowledgements

We thank E.J. Davis and K.W. Davies, who provided valuable comments on earlier versions of this manuscript. This work was supported by the United States Department of Agriculture (USDA) National Institute of Food and Agriculture Hatch project 1004721 and matching funds provided by the state of Oregon. Any opinions, findings, conclusions, or recommendations expressed in this

publication are those of the authors and do not necessarily reflect the view of the USDA or Oregon State University.

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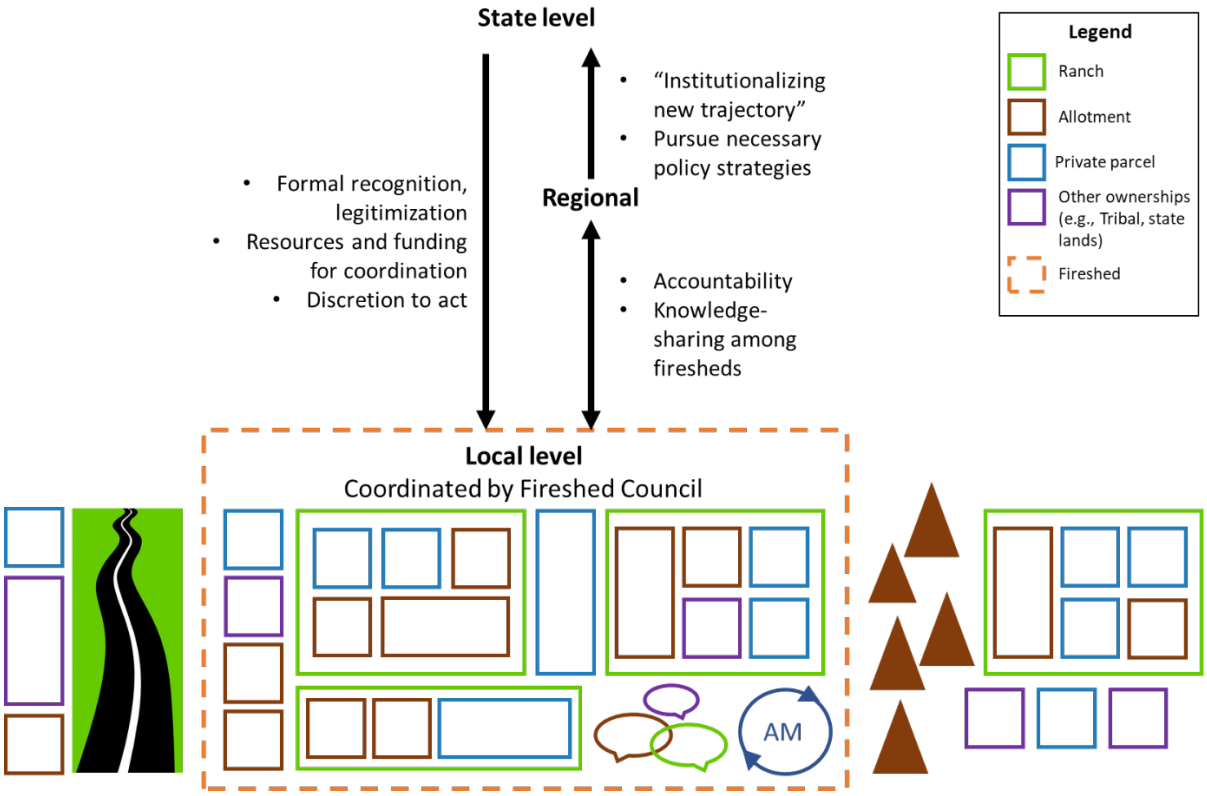
Figures

Figure 4.1. Proposed Fireshed Council model, incorporating a combination of private, federal (allotment), and other landownerships. Fireshed boundaries are defined by a combination of biophysical and social factors. Ongoing learning, negotiation, communication for adaptive management (AM) occurs within a fireshed, while necessary policy support is pursued by higher levels. The state level provides resources and funding for coordination; formal recognition enhances perceptions of Fireshed Council legitimacy at local levels.



Chapter 5: Conclusion

In interviews with over 100 ranchers, BLM staff, and other rangeland stakeholders for this dissertation, I heard general agreement that outcome-based rangeland management (OBM) and greater flexibility in grazing on federal rangelands is not appropriate everywhere or for everyone (see Results in Chapter 2). Furthermore, nearly all study participants wanted to make sure I understood that no new policies or revised regulations accompanied Idaho's vision for adaptive rangeland management; outcome-based approaches do not represent a loosening of standards for the BLM's provision of public goods on rangelands mandated by the Federal Lands Policy and Management Act. Below, I briefly reflect on these prevalent sentiments and the contributions of this dissertation.

This dissertation benefitted from a policy window, in which principles of OBM were taking shape during the course of this research through Idaho rangeland stakeholder discourse (e.g., through Idaho Rangeland Conservation Partnership) and within the BLM state and national offices (see Table 3.1). This permitted empirical study of the benefits and limitations of what, for the most part, ended up being an informal initiative with no directives or new administrative tools. Despite the informality, what OBM did serve to do is encourage local BLM offices and permittees to think creatively about grazing administration within current regulations to better respond to the realities of dynamic rangeland systems. With discretion for local levels to decide if and how they might incorporate OBM principles into grazing permitting, this offered an opportunity to examine the tenacious institutional work of a few savvy staff within BLM field and district offices. Chapter 3 describes some of this work, as well as the kinds of institutional work that will need to be undertaken for Idaho to realize its vision of transformational rangeland governance.

Regarding what was envisioned for federal rangelands in Idaho through OBM, this dissertation addresses apprehensions that if flexible, adaptive management approaches are to be a new norm for rangeland administrators, grazing flexibility will not be indiscriminately applied. Chapter 2 enumerates the specific combinations of contextual conditions (i.e., institutional arrangements) within BLM field areas under which accountable outcome-based approaches may be socially, ecologically, and legally feasible. I find that not only is resource condition important in these calculations, but also BLM leaders who evaluate the risks as well as permittees who have reliable records of good stewardship and relationships with their field offices.

Next, Chapter 4 expounded upon scale mismatches that occur when management actions at one spatial scale fail to account for how their effects aggregate at larger or different scales. This is the next frontier for OBM: the Taylor Grazing Act mandates that the BLM administers rangelands at the

allotment scale. Yet each allotment used for livestock grazing is part of a larger network of public and private lands ranchers rely upon for their annual forage needs. Ranchers are typically managing at a "ranch scale," comprised of this combination of public and private lands. How can BLM's administrative tools be used to administer multiple parcels constituting an ecologically-relevant scale?

Lastly, as public budgets shrink and social-ecological challenges persist, innovation within policy implementation is critical in natural resource governance. This is a balancing act in subsidiarity; the work must be done at a scale that is socially and ecologically meaningful and include actors with the authority, resources, and tools to act. Creating conditions for localized innovations will leverage the existing capacities of rangeland users and potentially shine a light on roles for an expanded slate of actors. This points to a shortcoming of the empirical chapters in this dissertation: the exclusive focus on the agency administrators and grazing permittees was a narrow representation of rangeland stakeholders in Idaho. While there were practical reasons for this, future directions for OBM and research in this area must acknowledge and incorporate the roles of rangeland stakeholders beyond the administrators and permittees. Where do these perspectives fit when crafting desired social outcomes for outcome-based permits? Who decides whose outcomes are desired?

Findings from this research will also add to scholarly work on natural resource governance arrangements that are responsive to social and environmental stochasticity but also assure accountability to prevent poor resource management. Future directions for this research could include a multi-state comparison of social and policy conditions for flexible federal rangeland administration. This expansion would have both research and management implications. Because federal policies are consistent among states, clarifying how policies are interpreted by local-level administrators has implications for other public managers seeking to clarify the boundaries of their discretion within the realm of "adaptive management."

Appendix A: Interview Guides and Materials

Chapters 2 and 3

Interview Guide 1A

Permittees (2018 Exploratory Interviews)

1. **A bit about you**
    a. Briefly introduce yourself (how long have they been ranching in the area? How much private ground? Allotments?).
    b. Describe your ranch's general goals/a desired scenario for management of your allotments.

2. **Knowledge about OBM and OBGAs**
    a. How would you say you or the BLM have used (or not used) OBM in the past? Can you share with me some examples of where you are using it on your BLM allotments (if not, on your private ground)?
    b. What are the advantages to an outcome-based approach (under what conditions is the approach appropriate)? Disadvantages?

3. **Achieving OBRM:**
    a. Do you think OBGAs/OBM makes sense for this [county, locale]?
    b. Please discuss any factors that you think may inhibit OBM in this [county, locale].
    c. Are there any helpful factors that may promote/make possible OBM in this [county, locale]?
    d. What does the BLM need to do to get this off the ground?
    e. What do permittees, like yourself, need to do to get this off the ground?

4. **Permitting:**
    a. In what way are you involved in the permit renewal process for your allotments?
    b. If you have suggestions or ideas for management changes, how are these communicated?
    c. If you could change one thing about permit administration, what would it be? What does the BLM do well?

5. **Policy tools:**
    a. Ask about if they have had a Temporary Nonrenewable Permit in the past. Ask about any permits that required NEPA analyses.
    b. Off the top of your head, can you think of other ways to achieve or improve flexibility in permitting?

6. **Wrap up:**
    a. What is one thing you want to make sure I understand from our conversation from today?
    b. Is there anything you'd like to add that we didn't get to?

Interview Guide 1B

Agency and Nongovernmental Organizations (2018 Exploratory Interviews)

1. **A bit about you**
    a. Briefly introduce yourself (position, how long you've been there).
    b. Describe your organization's general goals/a desired scenario for management of Idaho's rangelands.

2. **Knowledge about OBRM and OBGAs**
    a. How would you say Idaho has used (or not used) OBRM in the past?
    b. Tell me about Fall 2017 when the Department of the Interior directed the BLM to explore pilots for testing the Outcome Based Grazing Authorizations.
    c. How did you hear about the initiative/effort? (Email? Memo? Interagency meeting?)
    d. Do you anticipate any challenges in responding to the directive?
    e. What are the advantages to OBGAs (under what conditions is the approach appropriate)? Disadvantages?
    f. How do you see OBGAs fitting with this broader effort to implement outcome-based management in Idaho?

3. **Achieving OBRM:**
    a. Do you think OBGAs/OBRM makes sense for this [county, locale]?
    b. Please discuss any factors that you think may inhibit OBRM in this [county, locale].
    c. Are there any helpful factors that may promote/make possible OBRM in this [county, locale]?
    d. What does the BLM need to do to get this off the ground?
    e. What do permittees need to do to get this off the ground?

4. **Permitting:**
    a. Are there aspects of permit administration that you feel, in your current position, you can control?
    b. If you could change one thing about permit administration, what would it be?
    c. In your position, do you feel you have the discretion achieve OBRM in permitting if you think it is appropriate? If yes, do you have formal guidelines for doing it?

5. **Policy tools:**
    a. Ask about using Temporary Nonrenewable Permits. Ask about using Categorical Exclusions. Ask about blanket/programmatic EISs.
    b. Off the top of your head, can you think of other administrative tools for improving flexibility in permitting?

6. **Wrap up:**
    a. What is one thing you want to make sure I understand from our conversation from today?
    b. Is there anything you'd like to add that we didn't get to?

Interview Guide 2A

BLM Field Offices (Chapters 2 and 3)

1. **Background**
   a. How long have you lived in the area?
   b. What is your current position? How long?

2. **Fire history, agency approach**
   a. Tell me about fires in this Field Area.
   b. What is your office's general approach to fuels management prior to incidents?
      - In your view, is grazing useful for fuels management in this Area? Example of where your office was flexible with grazing to address fire risk (e.g., to reduce cheatgrass)?
   c. What is your office's general approach to management after incidents?
      - Tell me about how your office determines when an allotment may be grazed again following a fire.

3. **Knowledge about OBM, OBG, OBGAs**
   a. Have you heard of Outcome-based Management, Outcome Based Grazing, or the Outcome Based Grazing Authorization demos? [share working definition]
      - If yes, when did you first hear about it? From whom? How was it communicated?

4. **Specific tools (approaches) for OBM, flexibility**
   a. In your position, do you feel you have discretion to try new approaches to grazing management if you think it is appropriate?
   b. I'd like to talk about the Fall 2018 IM on "Flexibility in Grazing Management" [offer hardcopy]. What were your thoughts about the IM when you first read it?
      - The IM suggests offices should, "Develop grazing permits that provide flexibility to make adjustments in grazing use to account for changing conditions." In your position, how do/would you go about "making adjustments"?
      - The IM includes some examples for responding to changing conditions. For example, it suggests in cases of fluctuating forage production, alternatives could be developed/analyzed that allow a permittee additional livestock grazing use (temporarily increase AUMs). Do you see yourself doing that for some allotments in this Area (if you haven't already)? Under what (ecological, social) conditions? Do you have any concerns about this approach?
      - Did the IM change how you do your job? Do you think it might in the future?
   c. Are there tools/authorities do you think are being under-utilized by the District and this Field Offices for achieving flexibility/responsiveness to variable conditions?
      - If yes, why do you think they're not widely used?

5. **Implementing outcome-based approaches**
   a. In your view, what was the impetus for OBM/OBG?
   b. Do you think OBM/OBG makes sense for this Area?
   c. Are there barriers to implementing more flexibility in grazing management"? What are they?

d. What does the BLM need from its staff to use outcome-based approaches? What does the BLM need from permittees?

6. Wrap up

a. What is one thing you want to make sure I understand from our conversation from today?
b. Is there anything you'd like to add that we didn't get to?

Interview Guide 2B

Permittees (Chapter 2)

1. **Background**
    a. How long have you been in this area? What kind of operation? How much deeded? Allotments?
    b. Describe your operation's general goals.
    c. Tell me about the fire history in this area. Have any of your allotments or deeded ground been affected?

2. **Permitting**
    a. In what way are you involved in the permit renewal process for your allotments?
    b. What are your goals for how your allotments are managed/how you operate on BLM ground? Do you feel you can achieve these? If not, what is preventing you?
    c. If you have ideas or changes to your Allotment Management Plan, how do you communicate them (and to who)? Do you communicate fire risk concerns?
    d. If you could change one thing about permit administration, what would it be?

3. **Knowledge about OBM, OBG, OBGAs**
    a. Have you heard of Outcome-based Management, Outcome Based Grazing Authorization pilots, Outcome Based Grazing? (Share working definition). If yes, when did you first hear about them? From who?

4. **Specific tools (approaches)**
    a. The BLM issued an IM in fall 2018 to its staff regarding "flexibility in grazing management." I'd like to hear your thoughts on some of the follow examples from the IM:
        - Fluctuating forage production: alternative could be developed/analyzed that allows permittee additional livestock grazing use (temporarily increase AUMs)
        - When growth is delayed at higher elevations: keep livestock on lower range longer (but lower numbers than permitted)
        - Wet winter, early spring green up, increased fuel-loading risk: adjust season of use to allow permittee earlier grazing use (desired outcome = reduce fire risk)
        - If permittee wants to coordinate grazing on their private lands with their public land permits in a formal management plan

5. **Implementing outcome-based approaches**
    a. Would you say you have used outcome-based approaches on your BLM allotments in the past? If not, on your private ground? To reduce fire risk?
    b. Do you think OBGAs/OBRM makes sense for this [county, locale]?
    c. What do you think are factors that you think may be barriers to implementing OBM? For permittees? For the BLM?
    d. What do permittees, like yourself, need to implement outcome-based approaches to, for example, manage wildfire risk on your allotments?

6. **Wrap up**
    a. What is one thing you want to make sure I understand from our conversation from today?
    b. Is there anything you'd like to add that we didn't get to?

Interview Guide 3

BLM District and State Offices (Chapter 3)

1. **Background**
   a. What is your current position? How long have you been in that position?
   b. Have you ever worked in a field office? If yes, which one? For how long?
   c. Tell me about what you think are the main challenges facing your District.

2. **Implementing innovations**
   a. This study is partly interested in the conditions under which the BLM is innovating. We think of innovations as new activities or ways of thinking that involve developing or deploying ideas that challenge conventional wisdom or improve habituated practices within the BLM and between the agency and grazing permittees. What kinds of innovations would you say your District has undertaken?
   b. How does your office generally go about trying new things?
      - Who initiates new activities or procedures? (e.g., do Field Managers bring ideas to the District)
      - Are field offices generally free to experiment, or do they need to run things by the District?
   c. What do you think needs to be in place for BLM staff to try new things?
      - Are there any legal or administrative factors that enable or constrain innovation?
      - What other factors enable or constrain innovation?
   d. Do you think there are costs to innovating (social, legal, coordination)?
      - If yes, why do you think some BLM offices or staff choose to innovate?

3. **Communication, learning**
   a. How and when do you communicate with field offices?
      - Who typically interprets IMs or provides guidance on policy implementation?
      - [Probe] Would you say decisions are guided by formal policy or is it more about your office's collective experience and discretion?
   b. Do you feel there are opportunities for learning following decision making? If yes, what does that typically look like?

4. **Outcome-Based Management**
   a. Have you heard of Outcome-based Management, Outcome Based Grazing, Outcome Based Grazing Authorizations?
      - If yes, when did you first hear about it? From whom? How was it communicated?
      - Does OBM/OBGAs change how you do your job? Do you think it might in the future?
   b. I'd like to talk about the Fall 2018 IM on "Flexibility in Grazing Management." What were your thoughts about the IM when you first read it?
      - How do you think Field Offices should implement?
      - The IM includes some examples for responding to changing conditions. For example, it suggests in cases of fluctuating forage production, alternatives could be developed/analyzed that allow a permittee additional livestock grazing use (temporarily increase AUMs). Do you see yourself supporting Field Offices doing

that if it was appropriate for an allotment? What (social, administrative) conditions would make it work?

c. What does the BLM need from its staff to use OBM? What does the BLM need from permittees?
d. Do you think the OBGAs/OBM will lead to a bigger change in how public rangelands are governed?

5. Wrap up

a. What is one thing you want to make sure I understand from our conversation from today?
b. Is there anything you'd like to add that we didn't get to?

Grazing Flexibility Instruction Memorandum

Chapters 2 and 3

Accessed at https://www.blm.gov/policy/im-2018-109. Expired September 30, 2021 (after data collection).

FLEXIBILITY IN LIVESTOCK GRAZING MANAGEMENT

IM 2018-109
Instruction Memorandum

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240–0036
http://www.blm.gov

September 27, 2018

In Reply Refer To:
4120 (220) P

EMS TRANSMISSION 09/28/2018
Instruction Memorandum No. 2018-109
Expires: 09/30/2021

To: All State Directors (Except AK and ESO)

From: Assistant Director, Resources and Planning

Subject: Flexibility in Livestock Grazing Management

Program Area: Livestock Grazing Administration.

Purpose: This Instruction Memorandum (IM) provides guidance for use of the National Environmental Policy Act (NEPA) alternatives to provide flexibility in livestock grazing use and to analyze the effects of grazing use adjustments under various circumstances and conditions. In addition, this IM provides a framework and tools to develop grazing permits that provide flexibility to make adjustments in grazing use to account for changing conditions.

Flexibility in livestock grazing management is one component of the outcome based grazing (OBG) concept. The Bureau of Land Management (BLM) initiated 11 OBG demonstration projects and will use the knowledge and experience gained from

those projects to provide or update guidance for developing objectives, monitoring plans, and using flexibility in grazing use to achieve objectives. Field offices must develop locally relevant NEPA alternatives in consultation, coordination, and cooperation with permittees, appropriate state agencies, and interested parties.

Administrative or Mission Related: Mission Related.

Policy Action: This IM updates and supplements information contained in Handbook 4120-1 (Rel. 4-73, June 20, 1984) regarding the use of flexibility for managing livestock grazing on public lands managed by the BLM. The BLM may authorize grazing permits and leaseholders (permittees) to exercise flexibility by making adjustments in their livestock grazing use to accommodate changes in weather, forage production, effects of fire or drought, or other temporary conditions when flexibility is included in an allotment management plan (AMP) or its functional equivalent.[1] Allowing permittees flexibility to adjust their grazing use will provide more timely and responsive adjustments to changing conditions in order to achieve identified resource and operational objectives. There is no need for further authorization to exercise flexibility when it is included in the permit terms and conditions. However, the permittee must inform the BLM beforehand of their intent to make adjustments to the grazing use and the parties must communicate and coordinate with each other when making the allowed adjustments.

The appropriate time to create flexibility in a grazing permit or AMP is when processing a permit for renewal. One or more alternatives in the NEPA analysis for processing a grazing permit or an AMP must describe and analyze the grazing management adjustments to account for changing conditions. The described flexibility then becomes a term and condition of the grazing authorization (permit, lease) when the decision to incorporate the flexibility is issued. The alternative(s) describing flexibility must also include the objectives and a monitoring plan that identifies when adjustments are appropriate and how progress is measured toward achieving these objectives. Consultation, cooperation, and coordination are required during development of these alternatives with permittees, affected state agencies, other landowners in the affected allotment(s), and interested members of the public as defined in 43 CFR 4100.0-5. This mandatory consultation, cooperation, and coordination may occur with all parties simultaneously or in separate meetings. If the authorized officer selects the alternative analyzing such flexibility, the authorized officer will include the description of flexibility in the decision to issue the permit in accordance with 43 CFR 4160.

The following examples illustrate OBG flexibilities in grazing management and the type of management action(s) that can be utilized. These examples are meant only to be illustrative in nature.

1. A district has fluctuating and changing forage production. An alternative could be developed and analyzed that allows the permittee additional livestock grazing use, temporarily increasing the permitted use (active animal use months) as long as the

objectives that were analyzed—in accordance with the permit renewal process and applicable land health standards—are being achieved.

2. A permittee is normally scheduled to move to higher elevation range based on average vegetation stage and soil condition. Flexibility for the adjustment of this date could be provided for those years when forage growth is delayed or soils at the higher elevations are unusually saturated. Optional management actions could include reducing the number of livestock that are released on the lower range, delaying dates of use in the lower range, or adjusting the amount of use in future years to ensure achievement of objectives.

3. Monsoon and winter rains occur after the authorized season of use. As a result, spring green up is early and fuel-loading risk is increased. In order to adapt to this change in condition, the season of use could be adjusted to allow the permittee earlier grazing use with the intent of utilizing available forage and meeting the desired outcome of reducing fire risk. Flexibility in this example would be provided in the terms and conditions of the permit and allow for appropriate use and reduction of the fuel load.

4. Some permittees may want to coordinate grazing on their private lands with their public land permits in a formal management plan. Including private land in the formal management plan for grazing on the public land is at the discretion of the permittee or private land owner/lessee. Incorporating or integrating private land management with the public land management has the potential to increase the opportunities to exercise flexibility to adjust grazing use to meet needs of other resource uses, such as wildlife nesting/fawning or overwintering. If grazing on non-BLM land outside of allotments is to be formally integrated with the public land management, contact the local Natural Resource Conservation Service to determine the extent of their participation in development of an integrated plan.

Cooperative rangeland monitoring is a key component for implementing strategically sound grazing flexibility in OBG authorizations and all instances where flexibility is being utilized. The BLM rangeland professionals should continue to work with livestock permittees to develop clearly defined monitoring plans that will be included as terms and conditions of the livestock-grazing permit. Tools and a template for developing cooperative monitoring plans can be found in IB 2018-006 (https://www.blm.gov/policy/ib-2018-006) or by using other robust BLM, state, and/or locally developed resources.

The cooperative monitoring plans must describe the objectives and desired outcomes to be monitored, including the progress/achievement of land health standards. They must also include monitoring methods and protocols; a schedule for collecting data; the responsible party for data collection and storage; an evaluation schedule; and a description of the anticipated use of the data (e.g., adjusting season-of-use, assessing habitat, determining trends). Provisions for adjusting any of these components must be described in the monitoring plan.

The method to communicate the triggers used for adjusting livestock grazing use must be provided in the cooperative monitoring plans and permit compliance

documentation. Permittees and lessees must also document their use of grazing flexibility actions when informing the BLM of their intent to make an adjustment or at the end of the grazing year in an actual use report.

Time Frame: This IM is effective immediately.

Budget Impact: It is likely that more coordination will be required when incorporating flexibility into a grazing permit, compared to standard permit processing, especially when developing an AMP plan and a NEPA alternative that describes the flexibility. The extra coordination will include identifying the types of actions that may be taken, the criteria, circumstances for exercising the flexibility to take those actions, and developing the monitoring plan to ascertain whether the flexibility is consistent with resource and operational objectives. Less time may be needed by BLM staff to monitor and coordinate adjustments for each change in conditions over the life of the permit. While there will be no direct monetary impacts, the additional time needed to develop alternatives for exercising flexibility will impact other Bureau operations.

Background: In the past, the BLM has usually used the term flexibility as it relates to an allotment management plan or its functional equivalent as described in 43 CFR 4120.2(a)(3) (October 2005). However, the BLM can also exercise flexibility in grazing management by using non-renewable permits and leases (4130.6-2), particularly when additional forage is available. The agency can also use the permit renewal processes described in this IM to outline how amount of livestock use or season of use may be adjusted, if identified criteria are met.

Coordination: This IM was developed in coordination with the Department of the Interior Solicitor's Office.

Contact: If you have questions, please feel free to contact Dick Mayberry, Rangeland Management Specialist at 202-912-7229 or by email at rmayberr@blm.gov

Signed by:
Kristin Bail
Assistant Director
Resources,WO-850
Resources and Planning

Authenticated by:
Robert M. Williams
Division of Business

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[1] An AMP functional equivalent is an activity plan developed by another agency or permittee that prescribes grazing management and is approved by the authorized officer, or a plan developed by the BLM for other activities that also includes grazing management prescriptions.

Appendix B: Institutional Review Board Approvals

Chapters 2 and 3

University of Idaho
Office of Research Assurances
Institutional Review Board
875 Perimeter Drive, MS 3010
Moscow ID 83844-3010
Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: Dennis Robert Becker

Cc: Katherine Wollstein

From: Jennifer Walker, IRB Coordinator

Approval Date: November 10, 2017

Title: Analysis of Outcome-Based Management Policies on BLM Rangelands in Idaho

Project: 17-232
Certified: Certified as exempt under category 2 at 45 CFR 46.101(b)(2).

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the research project Analysis of Outcome-Based Management Policies on BLM Rangelands in Idaho has been certified as exempt under the category and reference number listed above.

This certification is valid only for the study protocol as it was submitted. Studies certified as Exempt are not subject to continuing review and this certification does not expire. However, if changes are made to the study protocol, you must submit the changes through VERAS for review before implementing the changes. Amendments may include but are not limited to, changes in study population, study personnel, study instruments, consent documents, recruitment materials, sites of research, etc. If you have any additional questions, please contact me through the VERAS messaging system by clicking the 'Reply' button.

As Principal Investigator, you are responsible for ensuring compliance with all applicable FERPA regulations, University of Idaho policies, state and federal regulations. Every effort should be made to ensure that the project is conducted in a manner consistent with the three fundamental principles identified in the Belmont Report: respect for persons; beneficence; and justice. The Principal Investigator is responsible for ensuring that all study personnel have completed the online human subjects training requirement.

You are required to timely notify the IRB if any unanticipated or adverse events occur during the study, if you experience and increased risk to the participants, or if you have participants withdraw or register complaints about the study.

University of Idaho
Office of Research Assurances

Institutional Review Board
875 Perimeter Drive, MS 3010
Moscow, ID 83844-3010
Phone: 208-885-6162
Fax: 208-885-6014
Email: irb@uidaho.edu

To: Dennis Becker

Cc: Chloe Wardropper, Katherine Wollstein

From: Jennifer Walker
IRB Coordinator, University of Idaho Institutional Review Board

Date: January 16, 2019

Title: Analysis of Outcome-Based Management Policies on BLM Rangelands in Idaho
IRB #: 17-232

Submission Type: Protocol Amendment Request Form

Review Type: Exempt

Protocol Approval Date: 11/10/2017

Protocol Expiration Date: None

The Institutional Review Board has reviewed and **approved** the amendment to your above referenced Protocol.

This amendment is approved for the following modifications:

- Interviews and focus groups with a new participant population

Should there be significant changes in the protocol anticipated for this project, you are required to submit another protocol amendment request for review by the committee. Any unanticipated/adverse events or problems resulting from this investigation must be reported immediately to the University's Institutional Review Board.