

Co-management during crisis: insights from jurisdictionally complex wildfires

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ABSTRACT

There is a general agreement within the wildfire community that exclusively top-down approaches to policy making and management are limited and that we need to build governance capacity to cooperatively manage across jurisdictional boundaries. Accordingly, the concept of co-management has grown in popularity as a theoretical lens through which to understand cooperative multi-jurisdictional response to wildland fires. However, definitional ambiguity has led to on-going debates about what co-management is. Further, there is limited understanding about the nature of co-management during crisis events. This had led to scholars posing the question: what is co-management in the context of jurisdictionally complex wildfire? In this paper, we seek to address this question based on interviews with leaders engaged in the management of jurisdictionally complex wildfire incidents. We propose a multi-level framework for conceiving co-management as strategic efforts of individual actors to cooperatively manage perceived interdependencies with others through one or more formal or informal institutional arrangements. We then demonstrate the value of the proposed framework in its ability to organise a series of questions for diagnosing co-management situations within the context of jurisdictionally complex wildfires.

Keywords: collaboration, collaborative governance, co-management, cross-boundary, disasters, multi-jurisdictional, network governance, wildfire, wildland fire.

Introduction

Since the initiation of the National Cohesive Wildland Fire Management Strategy in the United States in 2010, the concept of co-management has emerged as an organising approach in both policy and practice for considering the roles of federal, state, local, tribal and private landowners in preparing for and responding to jurisdictionally complex wildfires (e.g. Dunn *et al.* 2020; Davis *et al.* 2021). Co-management has a rich literature and history, but its application to crisis situations is relatively more recent. While jurisdictionally complex wildfires have many institutional attributes similar to traditional co-management contexts, including power-sharing dynamics in which questions of responsibility and authority are negotiated among jurisdictional actors, there are also some unique differences. Central among the differences is the crisis nature of large, multi-jurisdictional wildfires, often necessitating rapid decision making under conditions of high uncertainty and stress. This development begs the question – what does co-management mean in the context of jurisdictionally complex wildfires?

In this article, we take up this question, both theoretically and empirically, through a three-pronged abductive process. Abduction is an inferential reasoning process that jointly considers both the relevancy of existing theoretical insights and frameworks as well as remains open to emergent theoretical insights that are grounded in the data arising from a given context (Earl Rinehart 2021). First, we review extant literature on co-management, focusing on the theoretical roots of the concept at the intersection of rational choice, and historical and sociological institutionalism. We used key words to identify relevant literature, which included co-management, wildfire, natural resources

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and combinations thereof. Second, we reviewed prior descriptions of co-management in relation to constructs within the field of natural resource management. Finally, we empirically investigated perspectives on the practical meaning and significance of co-management based on interviews with leaders engaged in efforts to collectively manage jurisdictionally complex wildfire events. Based on our review of this portfolio of information, we make the argument for a (re)definition of co-management that productively delineates its potential contribution from related constructs in the field and illuminates what we believe is an exciting pathway for further advancing understanding of interdependencies in multi-jurisdictional spaces, especially under crisis conditions. In doing so, we acknowledge that co-management exists in the disaster response and emergency management spaces and falls under similar terms, such as public–private partnerships, adaptive co-management and civic co-management, among others (See Pennington-Gray et al. 2014; Holderness and Turpin 2015; Cahyanto et al. 2021).

Co-management in natural resource governance

What is co-management? This has been a vexing issue for those who study natural resource governance for decades. The only area of agreement related to co-management appears to be that there is no agreement on the definition of co-management (Armitage et al. 2007). Co-management, as a term, has been in use since the 1970s (Pinkerton 2003), although the practice of co-managing natural resources dates back more than 100 years (Berkes 2009). Earlier scholarship highlighted the more formalised legal facets, while more recent research has emphasised the process and learning aspects of co-management (Carlsson and Berkes 2005). Some argue for a more precise definition of the term (Holm et al. 2000; Castro and Nielsen 2001). For instance, Holm et al. (2000) recommend that co-management should be used only for institutional arrangements that have intensive user participation while also specifying what is being managed within the co-management arrangement. Others accept that the concept is unwieldy and poorly suited to specific classification (Carlsson and Berkes 2005), suggesting that ‘it would be pointless to try to define the term co-management more precisely because of the variety of arrangements possible’ (Berkes 1994, p. 18).

Why does a co-management definition matter? There are two competing schools of thought on this. One approach, as argued by Berkes (1994) is to avoid tight prescription. The advantage of this approach is to not artificially limit or constrain exploration of the construct, encouraging holism. However, the comparative disadvantage of low definitional clarity is construct creep, where concepts like co-management become hopelessly entangled with other constructs in the literature, making its unique contribution unclear. Without some communal sense of the term, it will be used imprecisely and uncritically, thereby becoming meaningless

(Pearson and Dare 2019). Operationalising the term, based on variable understandings of what it means to co-manage, has consequences for how we understand whether we are successful in our management (Sandström 2009; Cundill and Fabricius 2010). While we agree with the hazards inherent with premature definition and limiting of a construct, we suggest co-management is a mature concept in a crowded conceptual landscape of related constructs. Definitions clearly matter.

In this article we return to a key insight of Carlsson and Berkes more than 15 years ago: ‘If co-management is everything, it might as well be nothing’ (Carlsson and Berkes 2005, p. 69). We situate co-management among different bodies of literature by suggesting that it is a distinctive way to understand the cooperative management of interdependencies in relationships, while also keeping an eye on what co-management means under crisis conditions, such as a wildfire. Our goal is to find a more productive home for the concept of co-management as it is used in crisis contexts. There are many competing concepts such as collaboration, problem solving frameworks and networks that also seek to provide insight into how we can cooperatively manage interdependent relationships. In doing so, we return to a provocative question also posed by Carlsson and Berkes (2005, p. 71) ‘What is co-management good for?’

The theoretical roots of co-management

In exploring the ontology of co-management, it is useful to consider some of the theoretical perspectives that have helped define its intellectual lineage. Co-management has been described as an institutional arrangement for managing natural resources (Jentoft et al. 1998; Sandström 2009). Institutions are the rules, structures, laws, norms and cultural influences that govern human actions (Hall 1986; Thelen and Steinmo 1992; Peters 1999). There are three dominant theoretical families associated with institutional scholarship – rational choice institutionalism, historical institutionalism and sociological institutionalism. Two of these theoretical lineages previously have been invoked to explain the situations that gave rise to co-management – rational choice and sociological (Jentoft et al. 1998; Sandström 2009).

Rational choice institutionalism emphasises the intentionally created arrangements that influence an individual’s role in addressing collective action problems (Ostrom et al. 1994; Hall and Taylor 1996; Thelen 1999). This perspective argues that co-management is most likely to emerge when an existing resource governance arrangement no longer serves key participants well and a new formal set of rules or procedures need to be created to guide action (Sandström 2009). For instance, command and control natural resource management has often been invoked as insufficient for managing complex natural resource problems and thereby the impetus has been provided for experimentation with new arrangements that better serve individuals (Holling and Meffe 1996; Brunner et al. 2005). Common pool resource theory associated

with co-management is part of this lineage (Ostrom 1990; Jentoft *et al.* 1998). Accordingly, freely contracting individuals will seek alternatives because the benefits to them outweigh the costs of perpetuating status quo arrangements. A prevailing criticism of this perspective is that it fails to capture the significance of broader contextual influences and associated mechanisms that offer alternative explanations of human behaviour. This feature distinguishes rational choice intuitionism from the other two variants that more fully embrace contextual factors that shape behaviour.

Sociological institutionalism suggests that in addition to the rules, norms and procedures that shape action, humans are deeply enmeshed in cultural frames that guide meaning and action (Hall and Taylor 1996). Because individuals are embedded in numerous social, political and economic relationships, their decision space for creating new arrangements is constrained (Koelble 1995). Rather than rooting a decision in rational cost-benefit calculations, sociological factors such as perceived legitimacy, trust and social capital are paramount. Translated into a co-management context, preferences for action are not set exogenously by formal rules, but are shaped endogenously by relationships, including the networks in which key participants are embedded (Jentoft *et al.* 1998; Carlsson and Berkes 2005; Sandstrom 2009). In this way, co-management is seen as an approach to governance, rather than a formal power-sharing arrangement (Carlsson and Berkes 2005).

Historical institutionalists emphasise power-based relationships and how the outcomes from these struggles shape the policy, norms and rules by which arrangements are formulated, perpetuated and then re-cast over time (Hall and Taylor 1996). In short, relationships are embedded in contexts influenced by historical power dynamics that constrain some individuals from acting freely. When applied to a co-management situation, historical institutionalism suggests that some individuals have greater power and access to decision making arenas (Koelble 1995) and therefore exercise greater influence in co-management arrangements. Following on from this, powerful forces and entrenched interests may constitute formidable barriers in co-management arrangements, especially for those who lack a power base or who have previously been excluded from management arrangements.

The practical roots of co-management

One approach for defining co-management is to examine how it has been described in relation to other related constructs. Here, we examine co-management in relation to collaboration, power sharing, collective problem solving and network governance.

Is co-management collaboration?

Co-management has been defined by some as equivalent to collaboration and partnership (Jentoft *et al.* 1998; Castro and Nielsen 2001; Plummer and Fitzgibbon 2004;

Armitage *et al.* 2009; Sandström *et al.* 2014). According to these scholars, co-management is about the collaborative processes through which rules of resource use are formed (Jentoft *et al.* 1998). Characteristics of co-management within this perspective include pluralism, communication and negotiation, transactive decision making, social learning and shared action or commitment – all of which make co-management akin to collaboration (Plummer and Fitzgibbon 2004). Emergent processes result in a new negotiated order (Gray 1985), which can be dynamic take many different forms and produce different outcomes (Plummer and Fitzgibbon 2004).

Conceived thus, collaboration is the means by which co-management is achieved (Plummer and Fitzgibbon 2004). The obvious existential question raised in this literature is whether a conceptual delineation between collaboration and co-management is then useful. In other words, if co-management is essentially the outcome of collaboration, does the concept of co-management offer any unique theoretical value given the depth and breadth of literature dedicated to the study of collaboration? If not, should the concept of co-management be retired and replaced with the term collaboration or collaborative management to avoid artificially delineating literatures that, in fact, are studying essentially the same phenomenon?

Is co-management power sharing?

The most well-developed practical lineage associated with co-management is power sharing. Co-management has historical roots in power sharing between local natural resource user groups and the state (McCay and Acheson 1987). Co-management is often portrayed as a power-sharing arrangement related to a common pool resource where power is shared between the user community and the state (McCay and Acheson 1987; Berkes *et al.* 1991; Singleton 1998; Yandle 2003; Berkes 2009). Borrini-Feyerabend *et al.* (2000, p. 7) define co-management as ‘a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources’. Varying intensities and dimensions of stakeholder involvement can characterise different forms of co-management, according to Pearson and Dare (2019). Taking into consideration aspects such as actor positions, power, representation and interactions and roles, Pearson and Dare (2019, p. 377) suggest three ‘conceptual containers’ to bound how we understand the notion of power sharing. These include controlled, coordinated and collaborative models of power sharing. *Controlled* is a more hierarchically driven model that rests within a regulatory framework with state actors making decisions. These are more formalised relationships and enable expedited decision making. *Coordinated* is more inclusive than the controlled model and actively encourages greater participation from affected actors while retaining

decision making authority. Actors are ‘engaged with the knowledge that they do not have the final say in decisions’ (Pearson and Dare 2019, p. 368). *Collaborative* is the most inclusive form, with clear power sharing between the state and local entities.

Is co-management a problem-solving process?

Carlsson and Berkes (2005) question whether co-management should be understood as an institutional arrangement to share power or as the outcome of a process that results in power sharing. A co-management definition centred on power sharing misses the mark because co-management should be understood as a functional process for problem solving (Carlsson and Berkes 2005). As a problem-solving approach, co-management can be used as an alternative to: (1) allocate tasks, (2) facilitate the exchange of resources, (3) link different types and levels of organisation, (4) reduce transaction costs, and/or (5) help share risk (Carlsson and Berkes 2005, pp. 71–72).

The policy sciences literature is well developed when it comes to various stages or phases of the policy process (Lasswell 1971; Brewer and DeLeon 1983; DeLeon 1999). Additionally, within the policy sciences, problem orientation identifies five key tasks to orient oneself to a given problem, including specifying goals, describing trends, analysing factors that condition trends, projecting the future trajectory of key trends, and specifying and analysing alternatives (Lasswell 1971; Lasswell and McDougal 1992; Clark et al. 2002). Likewise, the social process lays out a framework for fully assessing the social aspects in which a problem and decision process is embedded (Lasswell 1971; Lasswell and McDougal 1992; Clark et al. 2002). The decision process specifies the key elements for analysing the phases through which a decision iterates (Lasswell 1971; Lasswell and McDougal 1992; Clark et al. 2002). In short, there is a well-developed literature, complete with its own journals and epistemological community, devoted to understanding the intricacies of problem solving. It is not clear that concepts of co-management offer a distinct advantage over the policy sciences for addressing problem solving.

Is co-management network governance?

According to Carlsson and Berkes (2005), narrow definitions of co-management as power sharing do a poor job of capturing the complexity and variation encountered in co-management. Their solution is to understand co-management as a system of governance, which can then account for multiple complexities – including the issue networks, epistemic networks and policy networks associated with the issue at hand. Whatever is being managed is embedded in a larger, networked, institutional context that must be accounted for and mapped to best understand its linkages. These include other systems at the regional, state or federal level that then impinge on the local system. This definition also aligns with the approach taken by

Armitage et al. (2007) who frame co-management as an innovative governance approach to address and adapt to multi-scale socio-ecological challenges. Socially heterogeneous, multi-level networks with vertical and horizontal linkages create connection, interaction and learning for more robust responses to govern complex socio-ecological systems (Armitage et al. 2009, 2011; Sandström, et al. 2014).

Conceived in this way, the study of co-management begins to conceptually align with the study of network governance (Agronoff and McGuire 2001; Klijn 2005; Klijn and Koppenjan 2015) and governance networks. Network governance has been described as the complex interactions that occur in networks of public, private and non-profit actors (Klijn and Koppenjan 2015). Kenis (2016) links network governance to collaborative governance, suggesting that network governance is the internal mechanics of collaborative governance instances. Klijn and Koppenjan (2015, p. 11) refer to governance networks as ‘public policy making and implementation through a web of relationships between government, business, and civil society actors. Governance networks are based on interdependencies, which are not necessarily equitable, between public, private and civil society actors’. Given the well-developed and robust literature on network governance, it is not clear that co-management has a comparative conceptual advantage to offer. The question arises: what is the construct of co-management good for, then, if it is not collaboration, problem solving or network governance?

As the review above suggests, collaboration, power sharing, problem-solving frameworks and networks offer ways for us to understand how we can cooperatively manage interdependent relationships. Finding the distinctive advantage offered by co-management within this crowded conceptual landscape will likely provide it greater conceptual and pragmatic power.

Emic perspectives, contextual variation and jurisdictionally complex wildfires

The literature reviewed above suggests three things. First, it illuminates co-management as a construct with broad appeal and a rich history. Concurrently, it is a concept with unclear boundaries, making it difficult to delineate its contribution relative to other related constructs. Second, extant literature intermixes normative descriptions with empirical cases, making it difficult to disentangle co-management as an aspirational state from co-management as a situational state. Last, debates about the conceptual lineage of co-management address a variety of units of analysis, including individual, dyadic or systems levels. Other conceptions fail to clearly specify the unit of analysis all together.

Our goal here is to better understand co-management during jurisdictionally complex wildfires response and its intersection with extant literature and theory on co-management. Emic perspectives are particularly useful in allowing scholars

to juxtapose the lived experience and perspective of practice with conceptual developments in the literature (Morey and Luthans 1984). Specifically, we asked jurisdictional leaders engaged in large multi-jurisdictional wildfire incidents to describe what co-management meant to them. Co-management has been considered across multiple contexts, including fisheries (Pinkerton 1989, 2019; Jentoft *et al.* 1998; Castro and Nielsen 2001; Hunter *et al.* 2018; D'Armengol *et al.* 2021), forests (Ros-Tonen *et al.* 2014), pastoral resources (Bollig and Lesorogol 2016; Sharma *et al.* 2016; Undargaa and McCarthy 2016; Basupi *et al.* 2019), parks and bioresources (Becker *et al.* 2017; Pearson and Dare 2019) and in Indigenous contexts (Berkes 1989; Pinkerton 1989; Agrawal 1995). In the present study, we focus on understanding co-management in the context of jurisdictionally complex wildfire events.

In a wildfire context, co-management has been referred to as a risk management strategy that integrates interactions and decisions of different stakeholders who have management interests affected by the fire (Calkin *et al.* 2015; Thompson *et al.* 2016). Wildfire as illustrative of crisis management situations also has specific conditions that set it apart from more routine natural resource management. Most crises are uncommon so their governance structures are emergent (Drabek and McEntire 2002). The network of actors that are required to respond to or support response for a particular incident is dynamic, based on the geographic location and incident attributes (Nowell and Steelman 2013, 2019).

In addition to the complex wildfire response context, there are established means of responding and communicating, at times with evolving actors and control systems. The Incident Command System (ICS) emerged as an overarching structure through which an Incident Commander (IC) can coordinate alignment of all responders under one command and is now the mandated system for agencies responding to all hazard events across the US. (Jensen and Thompson 2016). The combination of emergent governance with crisis response means that there are important questions related to representation in a co-management situation during a response (Steelman *et al.* 2021). Resources under a crisis management situation may also be scarce, thereby requiring trade-offs. This again has implications for who is represented within a co-managed situation to make these necessary trade-offs. Finally, a crisis is dynamic and who is involved in the co-management of it may need to change with the expansion or contraction associated with the footprint of the disaster.

Co-management is of increasing importance in wildfire response, as the concept is framed as a vital part of the pathway to more cohesive fire management strategy (Steelman and Nowell 2019; Dunn *et al.* 2020), and as

wildfires become larger and involve greater numbers of jurisdictions and individuals in the response (Nowell and Steelman 2013; Nowell *et al.* 2018). However, it is unclear how actors affected by wildfires conceive of co-management on multi-jurisdictional events.

Methods

To understand how co-management was defined and understood by jurisdictional leaders during complex wildfire events, we used an inductive phenomenological approach. The sample for this study included 74 agency administrators and land managers representing large private, state, tribal or federal jurisdictions affected or threatened by fire and ICs who were assigned to the events of interest. We targeted nine of the most jurisdictionally complex wildfire events occurring within the US in 2017. The fires represent incidents across five geographic fire response regions – Northern Rockies, Northwest, Southern, Southern California and Southwest areas – and five states – Arizona, California, Georgia, Montana and Oregon. Jurisdictionally complex wildfires were defined as Type 1 or Type 2 incidents nominated by a network of Type 1 ICs who managed these fires during 2017. These case nominations were then triangulated against archival analysis of ICS-209s¹ documents that returned a total of 69 wildfires. These 69 fires were stratified by the number of cooperators, values at risk and final size to result in the final identification of nine fires. Wildfires were selected based on having burned or threatened several jurisdictions, particularly incidents with state and federal land ownership. Each of the informants was involved in response and decision-making discussions that took place between agencies and representatives on each of their respective incidents. We included both public jurisdictions (national forests, national parks, state direct protection areas, county and municipal jurisdictions) as well as large private (e.g. commercial timber companies, ranches, private camps or recreational businesses) and non-profit landowners (e.g. The Nature Conservancy). The IC and liaison officer for each incident was our initial point of contact and from them, we identified a preliminary list of landowners as well as appropriate representatives. Representatives were identified as the highest-ranking individual representing that jurisdiction who was actively engaged in the incident. This list was verified and augmented by subsequent informants during the interview until we reached a point at which no new informants were identified.

During interviews, informants were asked about their experience on the focal incident, specifically concerning interactions with other affected jurisdictions. Data collection

¹An ICS-209 is a federal incident status summary report that is required for any fire under a full suppression management strategy that exceeds 100 acres in timber, 300 acres in grass and brush, or has a Type 1 or 2 incident management team assigned [retrieved 25/10/2022 from <https://www.predictiveservices.nifc.gov>].

was part of a larger project to understand how to improve co-management on jurisdictionally complex incidents. We initially asked interviewees about co-management on the incident of interest, but after interviews on the first incident, it emerged that a common understanding of the term across informants was lacking. We asked subsequent interviewees to first describe what co-management in a fire context meant to them, taking a phenomenological approach aimed at understanding commonalities and variation in emic perspectives and conceptual models related to how informants conceived of co-management. The questions asked were: (1) what does the term co-management mean to you in a wild-fire context? (2) What did co-management mean in the context of this incident? When it is going well, what does effective co-management look like? When it is going poorly, what does ineffective co-management look like? From these questions, a subset of text within the transcripts was the primary data for this project.

The analysis approach was inductive descriptive thematic analysis (e.g. Boyatzis 1998; Charmaz 2006, 2009; Clarke et al. 2015). The first author conducted a first-order coding of major themes and sensitising concepts that reflected the variation in informants' perceptions of co-management. Based on an initial review, all data were initially organised into three emergent major topics reflecting different elements discussed by informants in their descriptions of co-management. Second-order coding was then conducted within topic to identify themes and sub-themes with an emphasis on understanding the nature of variation in descriptions of co-management across informants. An initial peer check was conducted with the second author who reviewed all data associated with all codes. The authors used this peer check to discuss the variation that was observed within the data for each topic.

Through this interpretive interaction, the initial structure of the findings was outlined. The first author then drafted the phenomenological interpretation for each topic accompanied with documentation of raw data supportive of the interpretation presented. The third and fourth authors then conducted an independent review of the full dataset and provided an additional level of peer check of the phenomenological narrative and supporting quotes. During this additional level of peer check, the focus was on establishing the credibility of the interpretation based on peer check of the raw data (Lincoln and Guba 1986). All authors discussed any ambiguities or alternative interpretations, resulting in the final interpretation presented here. Out of concern for length, only a few supporting quotes were retained for each major theme or sub-theme to contextualise and demonstrate the credibility of findings.

Findings

When asked to describe what co-management meant to them in the context of a jurisdictionally complex wildfire

incident, jurisdictional leaders offered varied descriptions of co-management. Descriptions addressed one or more of the following three major topics that we label as: (1) global orientation toward co-management, (2) strategic orientation toward co-management, and (3) the relationship of co-management to structures of network governance. These topics were not categorical or mutually exclusive. Rather, they illuminated the concept of co-management as one that is complex and can be thought about from a number of different angles. Altogether, the topics paint a picture of co-management during crises that varies across a continuum of more individualistic to more collectivistic orientations and therefore is not confined to any one strategy (e.g. collaboration). Findings also illuminated that co-management is rooted in normative judgements of fairness and often takes place within, and is constrained and enabled by, institutional structures of network governance, but is not necessarily the same thing as network governance. In the following sections, we outline the major themes that emerged within each of these topic areas followed by a discussion of their implications for advancing both the theory and practice of co-management.

Global orientation toward co-management: creating unity/respecting diversity

In reviewing descriptions of co-management, one of the first insights was that descriptions differed in their relative emphasis on the importance of creating unity vs respecting diversity (see Fig. 1).

After asking informants to define and describe co-management, they were asked specifically to describe what co-management looked like when it was going well and when it was not. These probes allowed us to gain more clarity about the normative expectations associated with informants' understanding of co-management. The unity/diversity tension was evident in these normative descriptions as well. Some land managers viewed unity and diversity as competing tensions that would undermine successful co-management. In other words, they expressed a view of co-management as highly problematic, or even hopeless, under conditions where there were differences in interests, priorities and missions among stakeholders.

I don't know of co-management ever working, to tell you the honest-to-God truth. I mean, I think you have to have one person in charge... indecision is the worst thing. [...] if you're paralysed by having 15 different interests and they're all at odds with one another [no decisions are made].

[Co-management] looks at the partnerships, relationships. Folks were working together for a common mission and a common cause across – you know, regardless of jurisdictional ownership. We [the jurisdictions] all knew what our mission was. Where it's not working well, and

Collectivistic orientation	Individualistic orientation
Emphasis on creating unity	Emphasis on respecting diversity
<p>You've got to agree. You know, you have one common goal, one common interest, one common set of objectives, and there has to be buy-in from all partners.</p> <p>[Co-management] can go bad if we don't all agree on the best approach when we don't agree that we focused our resources on the highest probability of success even though it came at the expense of impacting a resource that may have been up under someone else's jurisdiction and we don't stand in locks sync with each other on those things.</p> <p>[In co-management] We serve as one team, one plan, one mission and I'm bringing my resources and my objectives and maybe another agency as well. And we're aligning, setting priorities, setting expectations and be consistent as agency administrators of how our team are to employ those objectives or to do that.</p>	<p>[Co-management] It's about the respect. You don't have to agree philosophically with each other, but you've got to respect that they have a different mission.</p> <p>I think co-management means there's more than one interest there, and so consideration for multiple priorities is probably -- it becomes an issue</p> <p>So I believe that part of co-management is looking at the mission for both departments. And our department missions are different, so those discussions have to be had.</p> <p>It means that you're bringing in multiple ... organizations with different priorities and different requirements, and then joining them together to manage for the better of the good or the whole overall incident</p>

Fig. 1. Global orientations toward co-management.

this is just my opinion, where things get rough is, you know, we have different missions and different land management strategies that sometimes just don't mix.

However, others viewed the presence of competing differences in priorities among jurisdictions as definitional to co-management. As a counterfactual, a jurisdictional leader representing the state described one jurisdictionally complex fire that did *not* require co-management because everyone was already in alignment – nothing needed to be co-managed.

But on this one [incident], I don't think the co-management was a factor. We were pretty much in alignment and it was fairly straightforward. We didn't have to make a lot of tough decisions, based on values at risk and resources, we only had one value at risk when we got here. We were in alignment on what that would look like. So I don't think [co-management] was much of a factor.

Informants most frequently described the management of different interests and missions as simply part of the process of co-management, per the quotes in Fig. 1 on 'Respecting diversity'.

Strategic orientation toward co-management

Interviews further illuminated that reconciliation of potentially competing interests and missions can be handled in several ways, with jurisdictions expressing different views and preferences in their strategic orientation toward co-management. Three core strategies of co-management were identified: (1) cooperative assistance, (2) negotiated coordination, and (3) collaborative singularity. These strategies were not described as mutually exclusive; stakeholders could move between them in response to changing conditions or their own mental model of the incident. However, each

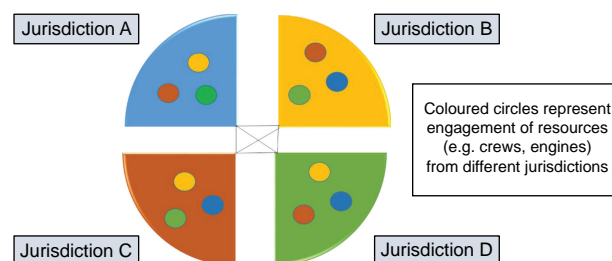


Fig. 2. Cooperative assistance.

reflected a different orientation toward how one goes about co-managing interdependencies with other stakeholders.

Cooperative assistance

In a cooperative assistance approach to co-management, a stakeholder looked to other jurisdictions for help in supplying crews and equipment in a mutual aid type of fashion to accomplish objectives on their jurisdiction that they could not otherwise accomplish. While this may occur under the same incident command organisation, the implicit assumption in this strategic orientation to co-management was that each stakeholder may be trying to accomplish something a bit different on their land with regards to the fire, but they need help from their fellow land managers to achieve this goal. As shown in Fig. 2, this strategy is distinguished from the other strategies in its emphasis on retaining jurisdictional autonomy while still addressing the need for communication, coordination and cooperative resource sharing between jurisdictions. In Fig. 2, each of the colours represents a different jurisdiction. A jurisdiction may lend aid to another jurisdiction as indicated by a coloured circle but the jurisdiction receiving aid still retains complete autonomy over all decisions and operations occurring on their

jurisdiction. Strategy development and planning may remain fragmented among jurisdictions.

The premise of this strategy is that the jurisdiction has operational control. Resources allocated to that jurisdiction from another will be used in a manner consistent with the objectives of the receiving jurisdiction's mission. In other words, this strategy expects that when in Rome, everyone acts like Romans.

Co-management working beautifully to me is all of us understanding and respecting and knowing that when it comes to us doing work or assisting you, we go into the mode of what we need to do to protect you and yours. You understand what I'm saying? So, I'm not going to go on [commercial private landowners'] property assisting them and use tactics that I would use for the US Forest Service.

The biggest thing is to recognise each other's priorities. And when you're working on that person's ground to understand [their priorities].

And so, when you have a fire like on the boundary with the forest, they may not be able to manage the fire in the same way, so you may have to manage it with two, essentially, two sets of objectives. One for their jurisdiction and one for ours, if that makes sense... And to do that with the same group of folks versus, you know, you do your thing and we do our thing.

Negotiated coordination

The second strategy, which we have termed negotiated coordination, had a similar emphasis on differing priorities and interests that each jurisdiction is trying to address. However, this orientation to co-management differed from cooperative assistance in the sense that it placed greater emphasis on the recognition that these different priorities need to be negotiated into a single, coherent plan and that certain values or assets may need to be sacrificed to protect other values or assets given limited resources. Fig. 3 shows this strategy is delineated by the integration of multiple jurisdictions into a single incident response, yet with a

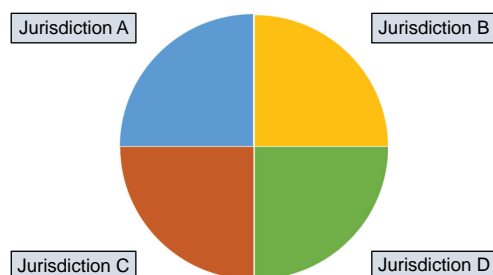


Fig. 3. Negotiated coordination.

strong emphasis remaining on the individual jurisdictions that comprise this composite organisation.

The co-management emphasis here is on convincing other jurisdictions to take your interests, concerns, and objectives into consideration when operational plans are being developed, even if they run counter to another jurisdiction's interest, mission or direct objectives. Understanding interdependencies of actions and objectives is paramount. Actions taken or not taken on one jurisdiction may have negative consequences for another jurisdiction. In other words, Jurisdiction A may ask Jurisdiction B to do something that runs counter to their core mission to protect Jurisdiction A's interest (e.g. putting fireline through a protected habitat to protect an adjacent private timber stand). In this case, a negotiation takes place among the leaders of affected jurisdictions, with each jurisdiction seeking to maximise their own objectives while still recognising that negotiation and compromise may be necessary.

When I think of co-management [...] I'm thinking we are working together, making good decisions based on jurisdictional needs but at the same time recognising the facts of what the incident's doing.

For me, it's respecting everybody at the table, mission and the values they represent. You know, moving more quickly into things like [joint management] even though the fire may still or may be on federal lands but realising that the private protection areas might be at risk.

Co-management of an incident is going well, what it means is that [...] the two jurisdictions that are involved are, are going through the process of having hard discussions to figure out what the best thing to do is. And if you have a difference of opinion, you're working it out and you're, you're at least honest and open about the fact that there are differences [of] either opinion and tactics.

Collaborative singularity

The last strategic orientation to co-management we describe as collaborative singularity. In this orientation, co-management was defined by the unification of all affected jurisdictions into a single organisation guided by one mission and one set of objectives and priorities. What delineates this strategy from other strategies is the emphasis on the subordination of individual jurisdictional interests in pursuit of higher-order, incident-level objectives that require the collective resources and efforts of all involved to accomplish the mission. Fig. 4 shows the boundaries between individual jurisdictions can become blurred within a collaborative singularity as the collective aims become paramount.

For some, this collaborative singularity was described as born out of negotiated coordination wherein affected jurisdictions weigh in on incident objectives at the onset.



Fig. 4. Collaborative singularity. Intermixed colors reflect subordination and blending of jurisdictional interests into a unified set of incident level objectives.

Last year [we had] four different agency administrators on this incident, it affected a [National] Park, the state and two National Forests. Took us a while to get there but to have the [agency administrators], even starting to identify the values at risk by having them mark them all on a map and pen, and said, 'Go circle the values at risk' and then asked, 'Why are those important to you?' Then had them prioritise them amongst the group. And they struggled. That was hard, it took them a good solid hour to come up with 'What was the number one priority?' All had good justifications for why theirs (priority) should be number one.

However, once those objectives are established, some assume the pluralism of the incident is resolved. All leadership, regardless of jurisdictional affiliation, is expected to speak with a unified voice concerning the objectives and priorities of the incident. Operational decisions, within this orientation, are based on established priorities using strategies and tactics deemed to have the highest probability of success based on the best data available at the time.

So when [co-management is] going well, you're not focused in the particular landscape that you are responsible for, you're willing to share resources to protect the highest values at risk regardless of where those resources may be associated. It's when you have either fire on multiple jurisdictions or at least a threat to multiple jurisdictions and those fire managers need to come together and develop a common set of objectives for the incident. And then that can be, you know,

disseminated through the ranks so that everybody's working toward a common cause.

[Co-management happens] with multiple agencies [...] just sitting down at the table and having that dialogue and putting personalities aside and having that unified approach on what's important and then sharing that risk, for lack of better words.

Co-management and structures of network governance

The final topic prominent in our informants' descriptions of co-management was the relationship of co-management to structures of network governance. By network governance, we mean formal structures that helped manage interdependencies among key participants. Armitage *et al.* (2007), Carlsson and Berkes (2005) and Sandström *et al.* (2014) suggest that there are informal network structures associated with co-managing complex socio-ecological systems, but do not go as far as to identify formal structures with co-management. Our informants frequently saw the concept of co-management as intrinsically linked to specific formal structures of network governance such as unified command and joint delegations of authority – mechanisms that specified how power would be shared. Unified command and joint delegations of authority refer to formal agreements between jurisdictions for jointly delegating operational command of some aspect of the incident response efforts (Steelman *et al.* 2021). These agreements delegate authority to one or more incident commanders for managing some aspect of the incident on behalf of the jurisdictions included as signatories on the agreement (for more discussion, see Nowell and Steelman 2019). In short, they are formal, written and signed mechanisms for identifying how decision-making power will be shared. For some informants, the concepts of co-management and unified command were viewed as synonymous.

I would think of co-management as unified command.

Well, it may be the same as unified command.

Others viewed formal network governance structures such as unified command and joint delegations of authority as distinct but related to co-management.

I think that you know we did have unified command, which is an aspect of co-management. But I don't think that you necessarily have to be in unified command to be co-managing the fire. In regard to this incident, I think I would consider that we were co-managing before we went into unified command. And afterward too, so for me co-management means just kind of shared influence, I guess, on management actions or management considerations for incidents.

Informants reflected about the institutionalised expectations of roles, responsibilities, modes of interactions and processes for co-managing a wildfire that are created with formal network governance structures such as unified command and joint delegations of authority. In particular, informants emphasised the value of these network governance structures for establishing one's legitimate authority to be part of the decision-making process.

[Co-management means] instead of waiting for it to actually get onto the private land, we should do a joint delegation, in that way – like an [State Department of Forestry] agency administrator has standing with the incident commander. If they're not on a joint delegation, then it's purely on how cooperative the IC and their nature is... of how much traction they're going to get with, you know, like contingency lines, things like that, that might be approaching private lands and yet if we do a joint delegation, then they have equal standing and can actually, you know, be at the table with some documented authority.

I think that's why the whole thing of going into unified command happened is because they felt that the incident management team didn't understand the importance of ensuring protection of lands. And so, you know, by going into unified command, that was going to give them more power if you will, to be able to, you know, make decisions and provide directions to the forces on the ground.

Discussion

Like any social construct, the value of the concept of co-management hinges on its ability to provide a robust lens through which to make sense of complex social phenomena. To advance knowledge, the application of the concept of co-management to crises must help us gain insight into our social world in a manner that is unique and value-added. Review of extant literature revealed the concept of co-management has considerable promise in this regard for helping us to understand inter-jurisdictional coordination during crises. Yet, for this promise to be fully realised, more work is needed in clarifying the practical boundaries that delineate what co-management is, what it is not, and how the concept can be leveraged in advancing our understanding of institutionally complex, multi-stakeholder crisis situations. This task must avoid tight prescription, yet provide a sufficiently robust definition framework to avoid construct creep.

The present study contributes to this effort to clarify the construct of co-management during crisis by investigating emic perspectives of co-management as understood and experienced by jurisdictional leaders in the context of a jurisdictionally complex wildfire event. We now consider how our empirical findings relate to the extant literature on co-management. We do this with an eye toward better

aligning the actual practices of co-management with the literature that describes and explains co-management. Our goal is to better position co-management during crisis as a concept that offers something unique in helping us gain greater insight into managing a collective good in jurisdictionally and institutionally interdependent decision spaces.

Co-management: what it is, what it is not

Our findings support a definition of co-management that is fundamentally anchored in perceptions of goal interdependence and associated efforts by jurisdictional actors to cooperatively manage these interdependencies, generally through agreements, contracts and policies, shared practices or other institutional arrangements with other jurisdictional actors. While this conceptualisation is not inconsistent with previous literature, it diverges from some previous scholarship on a few key points. We offer some key propositions below in the hope of advancing both theory and practice.

Proposition no. 1: co-management in crisis is, in part, an individual-level phenomenon, rooted in actions to manage a perceived interdependence

One of the first and most important insights from the current study is that different stakeholders nested within the same incident had very different ideas and preferences in relation to co-management. How different jurisdictional actors thought about co-management influenced their actions in attempting to co-manage perceived interdependencies. Given the individual-level variation, we suggest that the individual level of analysis, as distinct from a whole systems or dyadic analysis, is central to understanding co-management. This is somewhat counter-intuitive for a phenomenon that, on its surface, appears fundamentally relational in nature. While this remains true, our findings offer compelling evidence that different jurisdictional actors can relate to one another in very different ways despite being nested within the same multi-jurisdictional setting. If we do not attend to individual-level variation, we lose granularity in being able to understand the whole.

Individual variation was evident in global orientations to co-management as well as strategic orientations to co-management. Variation across jurisdictional leaders in their descriptions of co-management suggested these perceptions may vary over time. In other words, different actors may seek to manage interdependencies with other actors using different co-management strategies (e.g. cooperative assistance, negotiated order, collaborative singularity) and under different circumstances based on different perceptions and preferences.

Co-management preferences reflected differences across jurisdictional actors in their global orientation toward collectivism vs individualism. Those espousing more collectivist perspectives emphasised the importance of unity and the subordination of individual interests for the good of the

whole. Those espousing a more individualistic perspective emphasised the importance of recognising, respecting and accounting for individual needs, interests and priorities. Institutional theorists would argue that variation in these preferences across actors is driven by differences among actors in terms of their respective historical and cultural contexts that interact with rational decision-making processes in uncertain environments (Hall and Taylor 1996).

These findings point to the theoretical importance of the individual level of analysis in advancing the study of co-management. A driving assertion in our work is that if we lose the person-level perspective, we lose the theoretical foundation of the co-management construct. This insight harkens back to the institutional foundations of co-management theory – rational choice, historical and sociological – all of which begin at the individual level to frame expectations for human behaviour. Our findings support grounding co-management in the perceptions and subsequent actions of individuals in multi-jurisdictional situations, which simultaneously supports a re-rooting in the institutional theory into which co-management is embedded.

Proposition no. 2: co-management in crisis is not synonymous with collaboration

As discussed previously, a temptation in the literature has been to equate co-management with a particular approach or strategy for co-managing (e.g. Plummer and Fitzgibbons 2004). It is true that the formal and informal interactions and agreements entered into by diverse jurisdictions are an observable, tangible outcome of efforts to cooperatively manage interdependencies. However, findings from the current study illuminate that perceived interdependencies can be co-managed in a number of ways, rooted in different strategic orientations. This suggests that *co-management is a concept that is broader than any one particular strategy or strategic orientation*.

In the present study context, leaders' descriptions mapped onto three strategic orientations: cooperative assistance, negotiated coordination and collaborative singularity. In *cooperative assistance*, the emphasis is on cooperative action that gives priority to jurisdictional sovereignty and autonomy. Jurisdictions receive and give help to one another with the understanding that the home unit retains complete planning and decision authority in relation to actions taken on their jurisdiction. Strategic orientations that favour *negotiated coordination* emphasise the need for a singular, integrated approach that transcends jurisdictional boundaries but retains a strong focus on respecting jurisdictional autonomy and accounting for the different preferences and priorities of each jurisdiction. In *collaborative singularity*, the strategic orientation is focused on the subordination of individual jurisdictional identities in pursuit of a collective goal.

The argument that co-management should be conceptualised as something broader than a specific strategy is not

new. For example, Pearson and Dare (2019, p. 377) also suggest three 'conceptual containers' to bound how we understand co-management. These include controlled, coordinated and collaborative models of power sharing, which map closely to the categories we present here. The theoretical significance of distinguishing the concept of co-management from any particular strategic orientation or resulting agreement, policy, governance structure or practice is considerable. For instance, in some circles, co-management has become synonymous with the concept of collaboration (Plummer and Fitzgibbons 2004). Findings from the current study offer a strong counter-argument to this. Our findings suggest that jurisdictional actors seek to cooperatively manage perceived interdependencies with other actors through a variety of strategies. Collaboration is an institutional arrangement that fundamentally requires the recognition of a common goal (Gray and Purdy 2018). Findings from the present study reveal that it is quite possible, if not even common during crisis, for stakeholders to co-manage in situations where there is limited perceived overlap in goals. Certainly, collaboration is one possible strategy in situations of co-management, but it is not the only option. When describing co-management as collaboration, attributes of the case, event or situation are obscured. At the aggregate, these individual-level behaviours may manifest into observable system-level structure and behaviour that resemble collaboration, but such an approach can create an artificially monolithic depiction of the case and obscure the, arguably, more theoretically interesting individual and temporal dynamics by which this collective order is created.

The same argument holds true for the value of conceptualising co-management independently of any other structure of network governance such as a joint delegation of authority or unified command. While our findings indicated that these ideas are often conflated in practice, we argue that scholars would do well to maintain these delineations. As aptly stated by one of our informants, co-management can occur informally without formal structures of network governance. Further, there is a significant literature dedicated to understanding formal, institutionalised arrangements for governing multi-stakeholder contexts (e.g. Agranoff and McGuire 2001; Klijn 2005; Klijn and Koppenjan 2015). We argue that the concept of co-management in crisis has a bigger role to play in illuminating how different stakeholders engage with these structures.

Proposition no. 3: co-management is an aspect of a multi-level theory of governance during crisis

Collectively, the above conversation frames co-management in crisis as a theoretical lens for understanding how observable governance arrangements at the dyadic and/or systems level are the product of the collective individual-level perceptions and subsequent actions of

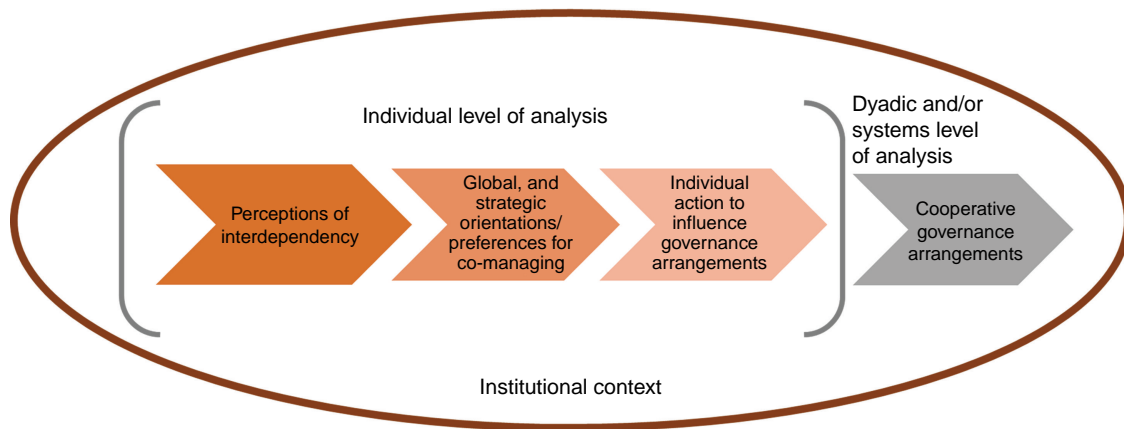


Fig. 5. A multi-level theory of co-management.

jurisdictional actors that are embedded within an institutional context, as represented in Fig. 5. Differentiating diverse strategic orientations among jurisdictions in their efforts to co-manage interdependence is important because different strategic orientations may be better supported by different governance arrangements. Competing expectations can lead to further conflict and misunderstanding if different actors are attempting to co-manage in different ways. Further, preferences in strategies likely reflect differences in how one perceives the nature of the interdependency in the task environment and one's power within that environment.

Based on current findings, we propose two types of interdependence may be particularly relevant for analysis of co-management crisis situations: resource interdependence and strategic interdependence. Resource interdependence exists when a jurisdiction lacks technical, human, financial, or physical resources needed to accomplish their goals. For example, fire operations on large wildfires often require more crews, expertise, control of airspace and equipment than any one jurisdiction has available. This creates interdependencies among jurisdictions based on demands for resource coordination and sharing. Strategic interdependence, on the other hand, has to do with actions taken by one jurisdiction having operational consequences for another jurisdiction. Wildfire has little regard for jurisdictional boundaries and fire operations on one jurisdiction can influence fire behaviour and outcomes for another jurisdiction. Fragmentation and lack of coordination in fire operations across jurisdictional boundaries are often not only ineffective, but can be dangerous for responders and affected communities. When one jurisdiction's actions on their land have consequences for another jurisdiction, it creates a strategic interdependency. Strategic and resource interdependence are not mutually exclusive; many co-management situations may entail elements of both.

As outlined in Fig. 6, how land managers perceive this unique combination of interdependence in any given situation may influence their strategic preferences for co-management. Specifically, we pose that the different orientations we

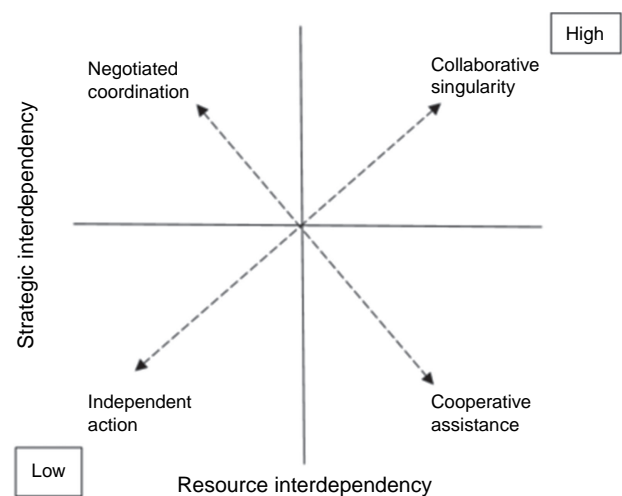


Fig. 6. Propositions on the relationship of interdependency type to strategic orientation.

observed may be explained, in part, by variation in how different jurisdictional leaders perceive the nature of their interdependence with other jurisdictions. Where leaders perceive little to no interdependency, either for resources or strategy, they may be more likely to pursue independent action (i.e. no co-management). If they perceive high strategic but low resource interdependence, they may express preferences for more negotiated coordination strategies. Alternatively, if they perceive high resource but low strategic interdependence, they may orient toward cooperative assistance arrangements. Finally, under conditions of high resource and strategic interdependence, jurisdictions may see the need for more collaborative approaches.

A path forward: institutional analysis of co-management during crisis

In the preceding sections, we leveraged emic perspectives of jurisdictional leaders to argue for a conceptualisation

of co-management in crisis that is: (1) anchored in an individual level of analysis, (2) broader than any specific strategy, and (3) provides a lens for multi-level theorising of the interaction of institutional context, individual perception and preferences, and the resulting multi-jurisdictional governance arrangements. These findings are aligned with and extend arguments put forth by previous scholars such as [Armitage et al. \(2009\)](#) and [Cash et al. \(2006\)](#) who have advocated for a multi-level conceptualisation of co-management. We suggest that these insights provide the grist for a refined definition of co-management in crisis. Based on these findings we define co-management in crisis as *strategic efforts of individual actors to cooperatively manage perceived interdependencies with others through one or more formal or informal institutional arrangements*. This approach is aligned with and supported by the theoretical foundation from which the concept of co-management originated. As such, to advance both theory and practice, we argue for a return to the theoretical roots of co-management: institutional theory and analysis.

As discussed above, there are three branches of institutional theory associated with the concept of co-management: rational choice, historical and sociological. In the application of all three as related to co-management, the analytic goal is to explain variation in actor preferences and actions to cooperatively manage some perceived interdependency. Rational choice involves rules that govern behaviour that are rooted in self-interest ([Ostrom et al. 1994](#); [Hall and Taylor 1996](#); [Thelen 1999](#)). In the wildfire context, this concerns perceptions of both resource and strategic/operational interdependencies in fire response and their influence on both global and strategic orientations toward co-management. It is through this theoretical lens that we are called to consider the goal-orientation and preferences of different actors and

how they perceive interdependencies with other actors in relation to these goals. Historical institutionalism concerns understanding the role of historical power relations and how they govern the choices available to different actors in their efforts to co-manage different interdependencies ([Thelen and Steinmo 1992](#); [Koelble 1995](#); [Hall and Taylor 1996](#)). In a wildfire context, this involves issues of power and access to different formal institutional arrangements like defining who is believed to be a 'valid' stakeholder and who gets invited to be a signatory on a joint delegation of authority. It highlights that not all institutional arrangements are plausible for all actors in all situations. Sociological institutionalism focuses on the social, political and cultural rules and norms that create meaning, constrain action and shape decision making ([Koelble 1995](#); [Hall and Taylor 1996](#)). It focuses on how legitimacy, trust and social capital are created and serve to shape action. In the wildfire context, this concerns things like how pre-existing relationships, organisational cultures and shared affiliations influence both global and strategic orientations to wildfire.

A more theoretically robust analytic framework emerges when we situate co-management as an individual-level phenomenon informed by an institutional lens. [Table 1](#) provides a general outline of the domains of future research that can be facilitated by this approach.

Insights gleaned here are applicable to practitioners managing wildfire events as they indicate that the need for understanding individual actors' perceptions of interdependencies, possibilities and responsibilities can be as important to successful communication and response as understanding collective institutional norms. These individual and institutional approaches lead to different strategic orientations toward co-management that differently inform how

Table 1. Institutional analysis of co-management.

	Analytic questions
Dyadic or system level	What formal or informal institutional arrangements have been created to govern interactions and joint efforts between interdependent actors?
Behavioural	What actions have actors taken to manage interdependence with other actors?
Rational choice institutionalism	How do actors perceive interdependence with other actors in this setting? What are the strategic preferences of actors for managing this interdependence? What do actors perceive as the cost benefit analysis of engaging with other jurisdictions? What strategic incentive do they have to participate? How do these perceptions and preferences influence behavioural engagement?
Historical institutionalism	Who has access to decision making? How are the different institutional arrangements governed? Who is privileged in these arrangements? Who is not? What are the rules for who gets to participate in which types of institutional arrangements? In what ways are perceptions and preferences of actors shaped by historical power relations?
Sociological institutionalism	What are the norms that guide behaviour in this context? What are the relevant social networks that influence behaviour? Who is perceived as legitimate? To what extent are different actors nested within institutional fields with competing norms and values?

jurisdictions relate and respond to one another, and this in turn impacts observable governance arrangements that can lead to different ways of decision-making and different outcomes. Those engaged in management and ICS positions should be aware of these differences in perception and not assume others share their lens without constant and clear shared communication.

Conclusion

In this study, we sought emic perspectives of co-management to understand what co-management means in the context of jurisdictionally complex wildfires and related meaning for understanding wildfire more generally. Our findings support a conceptualisation of co-management as a multi-level theoretical lens that focuses on how jurisdictions come to perceive interdependencies within a multi-jurisdictional situation, including how these perceptions interact with institutional contexts to shape and constrain both strategic preferences and actions. Finally, co-management is about how the combined actions and interactions of individual actors manifest into observed governance arrangements. In light of this, we advocate for the value of institutional analysis in advancing multi-level theories of co-management in crisis.

There are key differences between more traditional co-management venues with relatively fixed sets of involved jurisdictions and representatives and co-management in a wildfire context, and we would be remiss not to draw attention to these differences. Crises are dynamic, can have a more emergent governance structure that evolves over time, and operate under assumptions of standard operating procedures with a set group of actors under ICS. These differences suggest that co-management in a crisis context will be different from those under more stable conditions. And yet, more general theoretical principles from the institutional literature appear to hold as do insights from the empirical literature. We believe multi-jurisdictional wildfires are information-rich contexts for understanding co-management and draw confidence in the transferability of our findings given that themes revealed in the present study have strong parallels to extant literature drawn from other research contexts.

Situating co-management during crises in the institutional literature, complete with a focus on a multi-level analysis and perspective, allows a more nuanced understanding of co-management relationships. In doing so, we move away from the more normative, aspirational goals of the concept to empirically ground how individuals understand co-management and more closely align how theory and practice inform each other. Based on this theoretical re-situation, we offer propositions for further advancing how individual perspectives on strategic and resource interdependency inform orientations toward co-management in crisis situations. These propositions create the opportunity

to further test and refine more robust institutional understanding and choices for co-management among emergent, dynamic groups of actors as are found in wildfire response.

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