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# Giant Sequoia—Forest, Monument, or Park?: Political-Legal Mandates and Socio-Ecological Complexity Shaping Landscape-Level Management

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## ABSTRACT

Giant sequoia are endemic to the western slope of the Sierra Nevada, confined to approximately seventy groves spared from 19th century timber harvests. While nearly half of these groves were afforded protections through early National Park designations, only recently at the turn of the 21st century have the remainder of these been given protections on multiple use National Forest land. However, these megaflores continue to be impacted by forces exogenous to the groves themselves, including climatic change, high severity wildfire, exurban land use pressures, and industrial levels of tourism. The history, designation and current management of Giant Sequoia National Monument is emblematic of this shift from proximate impacts to a recognition of more systemic, landscape-level phenomena. We explain this shift in the scale of management through political-legal mandates, climatic and ecological complexity, and permissible recreational activities. The landscape unifies these processes across a monument on forest land, adjoined by parks.

## ARTICLE HISTORY



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Giant sequoia; national monument; scale; socio-ecological systems; visitor use management; wildland fire

## Introduction

Giant sequoias, logged to near extinction over a century ago, were first given federally-protected status when Abraham Lincoln included the Mariposa Grove in the Yosemite Grant in 1864. Aside from timber production, sequoia groves throughout the Sierra Nevada were being threatened by another proximate, yet cumulative impact that continues to this day: industrial tourism (Abbey 1968). *Sequoiadendron giganteum* have a shallow root structure that is made vulnerable by soil compaction from high levels of visitation and the infrastructure of roads, parking, trails, and campsites that support it. Nearly half of the approximately seventy giant sequoia groves that survived into the 20th century were given protected status in national parks (Parsons 1992). Conservation of the three dozen groves that remained on U.S. Forest Service lands and a handful of

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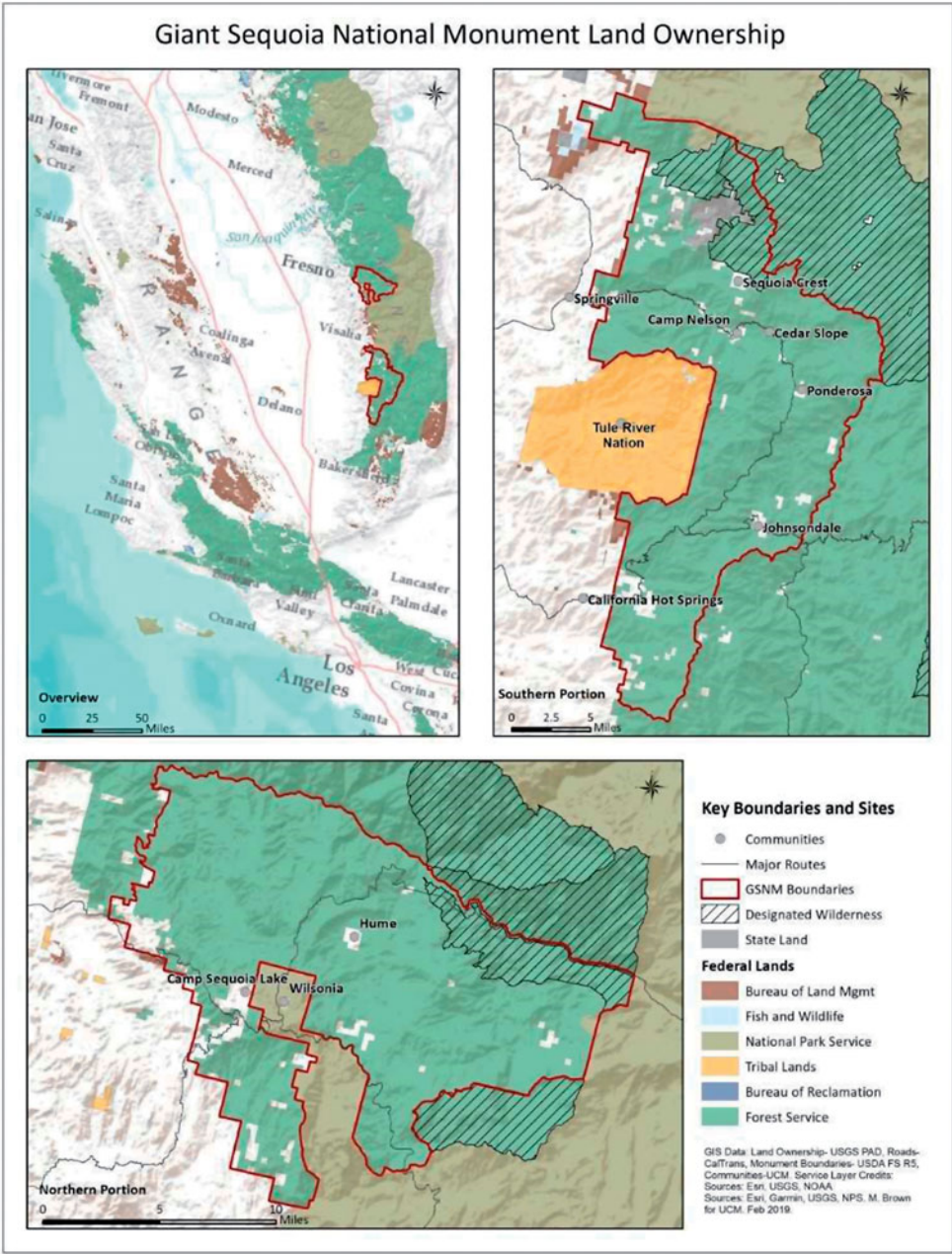
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adjoining private parcels unfolded through more de facto means and with a multiple use mandate.

U.S. Forest Service lands are managed for multiple use through the sustained yield of multiple, overlapping extractive and recreational land uses in accordance with the Multiple-Use Sustained-Yield Act of 1960 and the National Forest Management Act of 1976. In 1992, George H.W. Bush signed Proclamation 6457 mandating that sequoia in the national forest system be “managed, protected, and restored” thereby eliminating timber sales and other activities within the groves (Proclamation No. 6457 1992). Subsequently, in 2000 Bill Clinton expanded the protected area around these groves through the Antiquities Act to establish the 328,000-acre Giant Sequoia National Monument, henceforth referred to as The Monument (Proclamation No. 7295 2000). Figure 1 shows present day regional land ownership and jurisdictional boundaries. This designation, set within the Sequoia National Forest, which otherwise manages for multiple use recreation and economic access, culminated in the 2012 Giant Sequoia National Monument Management Plan. The public planning process and subsequent litigation highlight the tension between preservationist and utilitarian policy mandates, driven by perceptions of a national monument managed like a national park located within a multiple use national forest.

The grove level protection in 1992 established the spatial extent for public understanding of boundaries and associated constraints. At the time of creation in 1992, the largest protected areas of sequoia were 3,000 to 4,000 acres. Upon expansion to full Monument status in 2000, what once were multiple distinct clusters up to several thousand acres became two spatially vast regions covering over 320,000 acres. The protected area expansion required growth in the scale of governance needed to manage the giant sequoias at the landscape level. Increasing from grove level protection solely for trees to landscape level protection requires upscaling of personnel and financial resources to support the variety of departments within the Forest Service. The increased scientific understanding of complex and interacting climatologic and ecological systems and the necessity for landscape-level maintenance expanded the interpretation of the spatial bounds of the “smallest area compatible” written in the Antiquities Act. However, the autochthonous sequoia groves would still face threats. In response to a lawsuit in 2005, a federal judge halted and subsequently issued a permanent injunction against logging in The Monument. The lawsuit was initiated by the Sierra Club against President George Bush’s push to open The Monument to commercial logging. In 2017, The Monument faced scrutiny during the Department of Interior’s review of all National Monuments created after 1996 and over 100,000 acres for potential downsizing. The Monument was spared for a second time.

We look at the divergent political-legal discourses of recreational access as well as the complexity of exogenous socio-ecological forces that in part determine how effectively (or ineffectively) mandates are rolled-out. Typically, the discourse over land use and access rights to protected areas between historic land user “gardeners” and preservationist “guardians” unfolds around *proximate* impacts such as logging and grazing or the potential for impairment of archeological resources, as well as the size of the designated area. Indeed, per the Antiquities Act of 1906 (1906), “the limits of the parcels shall be confined to the smallest area compatible with the proper care and management of the objects to be protected.”



**Figure 1.** Since the late 1800s key legislation and government actions have established governance boundaries within which the genesis of Giant Sequoia National Monument occurred and continues to operate.

The continuing debate at Giant Sequoia National Monument is as much about the impacts to land within The Monument as it is about the exogenous forces that shape The Monument by transcending its current borders. Unconstrained forces of climate change and land use include changing regional temperatures and hydrological regimes;

wildland fire, tree mortality, and ecological disturbance; checkerboard ownership and development at the wildland-urban interface; and higher levels and shifting demographics of visitation. These forces necessitate a Shared Stewardship Strategy and a Protected Area-Centered Ecosystem (PACE) approach (Hansen et al. 2014). In this paper, we utilize interviews with interest groups, managers, and land users, content analysis of policy and management plans, and on-site assessments to explain and predict the scale of protection most suited to manage both the proximate impacts and exogenous forces shaping the landscape in an era of socio-economic and environmental change.

## Complexity of Land Management in the Sierra Nevada

The social and ecological issues confronting managers of recreational forests and parks in the Sierra Nevada are inherently complex, including: shifts in the climatic envelope of temperature and precipitation for many species, the ecological disturbances that emanate from these changes such as tree-mortality and wildland fire, subsequent management interventions needed to protect cultural and natural resource exposure, and economic impacts on gateway communities when natural hazards limit visitor access (Monahan and Fisichelli 2014; Turner et al. 2017). Processes including wildland fire and pine-bark beetle die-off, further complicated when coincident with encroachment from rural development, transportation infrastructure, and the patchwork of private inholdings within lands overseen by federal agencies, require forest management at the landscape scale. The intersection of complex socioeconomic, biophysical, and political-legal layers of the forest and surrounding region can result in a classic wicked problem where there is disagreement among stakeholders about how the problem is defined and what solutions may exist (Salwasser 2004). Forest systems that can successfully adapt to changing government, market, and environmental forces are therefore not as much the right scale as they are an emergent and dynamic alliance of scale (Rudestam et al. 2015) where social, ecological, and managerial challenges problems and solutions coalesce across the landscape. Regional political ecology utilizes a meso-scale lens of analysis where landscape can be understood as a spatio-temporally emergent interface of smaller, faster, and larger, slower phenomena, from environmental systems to political and economic organizations (McKinnon and Hiner 2016). This region of the southern Sierra Nevada offers utility as a heuristic not so much due to *a priori* designation as political or ecological unit of analysis. Rather, the Sierra is a dynamic interface zone where phenomena emerge, interact, and feed-back across spatial and temporal scales.

The southern Sierra Nevada region incurs a disproportionate amount of ecological disturbance from climate change when several critical hydro-ecological processes are considered, including greater susceptibility to earlier run-off timing and more pervasive tree mortality (Null et al. 2010). The range continues to receive lower-than-normal precipitation in fewer, more random, higher magnitude events, and experience increases in temperature, which together affect evapotranspiration and create a water balance deficit throughout the forest (Lutz et al. 2010). The duration and severity of drought conditions, along with higher-than-average temperatures have resulted in an upslope shift in the climatic envelope. Species that have successfully adapted to these ranges, including



the narrow band where sequoia occur, are especially vulnerable. This shift has led to drought-induced stress for vegetation throughout the Sierra Nevada and has dramatically exacerbated natural processes such as the rampant proliferation of the pine bark-beetle, with approximately 129 million trees dying between 2012 and 2016 (Restaino et al. 2019).

The management paradigm of wildland fire suppression and the resulting fuel load in combination with increased heat and drought conditions has led to denser forest coverage that is more vulnerable to pine bark beetle and has made large extent, high severity mega-fires a more regular occurrence (Crockett and Westerling 2018). From the 1930s to the 2000s the number of large trees in the Sierra Nevada decreased by half while the density of small trees doubled due to a combination of timber production, fire suppression management, drought-induced stress and high-severity fire (Kocher 2015). Fire and insect outbreaks are some of the most visible manifestations of climatic-induced forest disturbance, the meso-scale energetic spillover of interactions between larger and faster atmospheric processes and smaller and slower biophysical floristic response (Holling 2001). These complex landscape-scale processes that drive forest change are the product of biophysical interactions as well as market forces and political-legal drivers that transform ownership and land use (Messier et al. 2015). The economic evolution of Sierra Nevada forest lands demonstrates this point.

The Sierra Nevada timber industry began its decline in the 1970s with economic stagflation and offshoring of timber production and continued into the 1980s with exurban housing growth and citizen-led zoning efforts meant to protect “natural heritage” that together resulted in the eventual closure of most of the region’s timber mills (Walker and Fortmann 2003). This “ecotransformation” (Duane 1999) consists of a shift in the economic reliance of regions from “Old West” extractive industries, grazing, and timber production to “New West” exurban housing, amenity-driven tourism, and conservation investments. Sierra Nevada gateway community residents increasingly rely on visitation to surrounding public lands. While tourism spending on meals, lodging, and recreational activities in and around parks, forests, and monuments is portrayed as a boon to rural community economies, it is in actuality a much needed substitute for the region’s livelihoods of yesteryear that have since declined (Jakus and Akhundjanov 2018; Yonk et al. 2019). Furthermore, these gateway community economies remain vulnerable to seasonal visitation spending fluctuations along with less predictable hazards like floods, fires, and landslides that worsen air quality, impact scenery, and limit access for tourism spending.

Gateway communities in the foothills and forest of the Sierra Nevada are part of the wildland-urban interface (WUI), a zone where housing meets forest land. WUIs regularly occur as a checkerboard of public and privately owned parcels, the discontinuity of which can complicate an agency’s ability to manage landscape level processes. The WUI in the United States grew rapidly from 1990 to 2010 in terms of both new houses—from 30.8 to 43.4 million, a 41% increase, and land area—from 581,000 to 770,000 km<sup>2</sup>, a 33% increase (Radeloff et al. 2018). Inside the Sequoia National Forest boundaries, there are approximately 17,000 acres of inholdings, legacy private ownership surrounded by federal land. Consensus between private landholders and agency decision-makers on landscape-level management priorities and economic activities remains elusive,

especially when considering the varied missions of agencies involved, from Federal lands managers to local County Board of Supervisors (funded by the state) to municipal governing bodies, whose resolution and communicative rationality of the issue differ. This ownership checkerboard is especially detrimental in high fire risk areas as it impedes placement of strategic fuels treatments adjacent to communities.

Laws and policies that determine baselines to guide management goals, set prescriptive implementation strategies, and create legal limits to respond and intervene have been rigid and constrained in their ability to handle environmental uncertainty and dynamism. In recognition of this disconnect between landscape and lawscape, land management agencies have begun to craft more adaptive institutional frameworks that emphasize collaborative planning among a wide range of stakeholders, roll out flexible plans to account for uncertainty, rely on comparable data as indicators for evaluation over time, and integrate learning to make course corrections possible (Higgins and Duane 2008; Littell et al. 2012). In 2010 the National Park Service released a *Climate Change Response Strategy*, and the Forest Service released its Ecological Restoration and Resilience manual. Sequoia and Kings Canyon National Parks released their collective *Climate-Smart Resource Stewardship Strategy* in 2017 which recognizes the need to manage for changing environmental conditions that will impact recreational resource opportunities. The Inyo, Sierra, and Sequoia National Forests are now concluding a multi-year Forest Plan Revision Process as part of the 2012 Planning Rule of the National Forest Management Act of 1976. The Forest Plan Revision Process will catalyze more adaptive planning efforts through a greater emphasis on public participation and indicator-based triggers for adaptive management in resource protection, ecological change, forest economies, and recreational impact. It is important to note that while the Forest Service may embrace the concept of resilience, it ignores the outmoded assumptions of ecosystem stability, as reflected in the Multiple-Use Sustained-Yield Act of 1960. Such restoration goals focus on a return to historical conditions rather than processes that maintain feedbacks and conditions (Benson and Garmestani 2011).

Regardless of the type of federal lands agency and its mandate, unit-level approaches used to respond to rapid change are by definition capacity-limited and resource-constrained. Limited time and resources require decision-makers to triage their response through prioritization of agency action items. Land managers utilize a variety of adaptive strategies for resistance, resilience, and response. Temporary sprinkler installation in sequoia groves to ward off encroaching fire, restoring natural hydrological function to resist pine encroachment in meadows and assisted migration demonstrate these three Rs of adaptive strategy (Millar et al. 2007).

## Methods

A national level nonprofit organization with a preexisting relationship with Giant Sequoia National Monument facilitated connection with five initial interviewees. Snowball sampling was used to identify one additional interviewee. The small n sample prevented statistically significant evaluation. Despite the small sample, the qualitative information provided indicated trends and recurring themes across agencies and organizations of various scales which included two local recreation-based nonprofits, one local

environmental justice based nonprofit, one federal public land manager, one nationwide environmental organization, and one federal engineering agency (Goodman 1961; Biernacki and Waldorf 1981). This qualitative approach of referral chains was beneficial because it directed the authors to interviewees with valuable institutional knowledge of inadequately documented events. The authors judiciously arrived at ten, open-ended questions with terminology that was broadly applicable to all participants ranging from local nonprofits to federal government roles. Question categories included current challenges, opportunities for growth, opportunities for collaboration, and political challenges.

The data collection phase included a literature review of hardcopy and digital sources. Physical copies of texts that provided information on recreation in The Monument included Forest Service flyers on recreation constraints, trail maps, “Top 10” style flyers, and leaflets at various gateway communities around The Monument. The textual analysis identified four categories of supplemental documentation about The Monument, including hardcopy formal, hardcopy informal, digital formal, and digital informal. Hard copy formal documents included Forest Service flyers and leaflets professionally developed by local tourism bureaus, as well as remotely stationed Forest Service road closure maps, associated with local fire conditions. Handwritten commentary and hand-drawn “neogeographic” maps encountered in a custom binder in the Camp Nelson market exemplifies informal hardcopy information (Goodchild 2008). Digital formal textual sources include government and organizational websites, while digital informal textual information about The Monument included crowdsourced informational websites such as TripAdvisor, Yelp, and YouTube.

Textual data on The Monument collected from crowdsourced websites were less trustworthy than data collected from websites run by formal organizations. Visual content analysis was used on the crowdsourced data sites Yelp and TripAdvisor for key words and phrases and associated synonyms. The misinformation resulted from a significant number of crowdsourcing participants being unable to distinguish between features in The Monument, Sequoia National Forest, and Sequoia and Kings Canyon National Parks. The quality of information was readily distinguishable between locals with in-depth knowledge (including out of area repeat visitors) and first-time visitors.

Multiple policy and management documents were reviewed during the process to understand priorities in the protection and maintenance of the giant sequoias. The central document utilized for understanding The Monument at the landscape level is the Giant Sequoia National Monument Management Plan of 2012. The document is a vastly more comprehensive assessment than the original 1992 Bush designation which was more narrowly focused on protection of the giant sequoia groves and expands greatly upon vague statements and attributions within the 2000 Clinton Proclamation. It also builds upon a subset of information and actions from the original 1988 Sequoia National Forest Land and Resource Management Plan and its 2001 amendment. Ultimately, the Management Plan was developed as a result of the 2004 Giant Sequoia National Monument Final Environmental Impact Statement and subsequent Management Plan Amendment that same year in accordance with the requirements of the National Forest Management Act. Given the Forest Service based multiple-use approach, the Management Plan encompasses a wide range of strategies and objectives



to confront challenges related to the WUI, wildfire risks associated with the interface of private property and Sequoia and Kings Canyon National Parks, giant sequoia health, fisher habitat, off-highway vehicle use, and the need for inter-agency coordination.

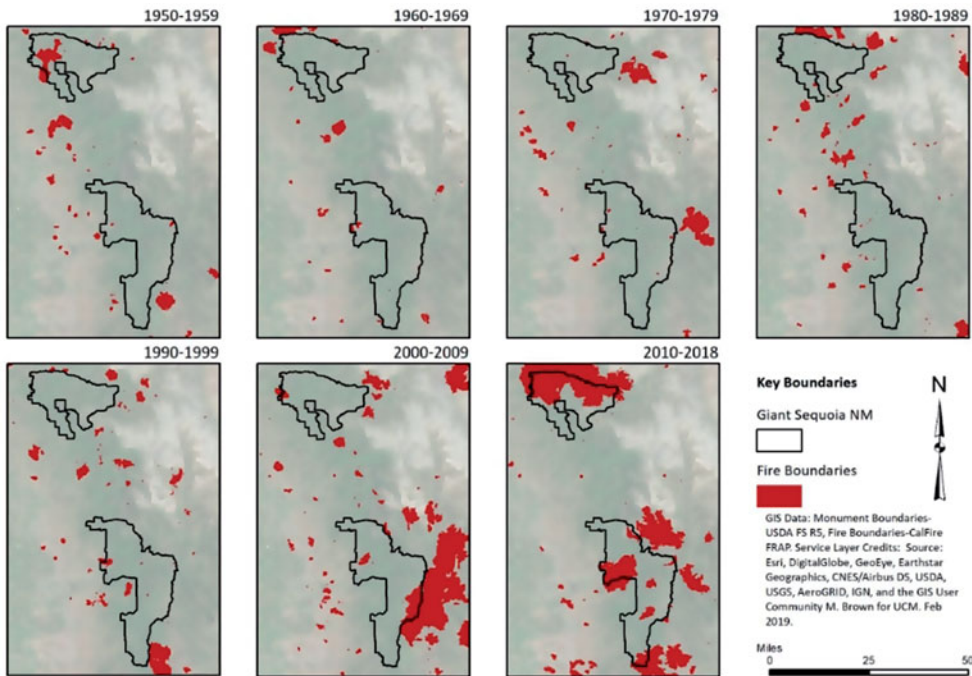
## Results and Discussion

### *Natural Processes Warranting a Landscape Scale Management Approach*

Multiple ecological factors in The Monument reinforce the argument for a landscape scale approach to management. Factors requiring landscape level management can operate independent of one another or as a synergistic system with spatiotemporal linkages, feedbacks loops, and emergent phenomena that require an adaptive approach. Factors of varying sizes need large spatial scales of management, from the smallest mammals to massive fires.

Indicator species, such as the pacific fisher, a cousin of the weasel, continue to raise questions about how to manage for species that infer success of their neighbors. There has been disagreement on how to manage fires in and around the giant sequoias and how burn severity may impact the success of this key indicator species. Logging companies have co-opted the pacific fisher to combat the poster child of environmentalists—the spotted owl. The logging industry has argued that logging and timber removal is more beneficial to the fisher given the more frequent high severity burns now occurring from a combination of drought, increased temperature, and large-scale tree-mortality. This is true but doesn't account for the heterogeneity of the landscape and the benefit to the success of the fisher it provides. When fires burn, even higher severity than typified for fishers to succeed, they do not burn consistently hot, and pockets of refugia remain in mature forests where fishers can survive (Hanson 2013). Pacific fishers continue to succeed at hunting and living beyond the boundaries of individual groves in their desired conditions of snags and high canopies as created by mixed severity burns.

Prescribed burning under desirable conditions can result in the simulation of naturally occurring processes that happened before a century of full suppression and near exclusion of wildfire. The National Park Service has utilized prescribed burns in The Monument vicinity, beginning in the 1960s in neighboring Sequoia-Kings Canyon National Parks. Fire is a landscape level process that supports the management of groves on a landscape level. Fires in these dry forests spread at rapid rates through groves and surrounding timber with embers jumping fuel breaks, driven by wind, fuel load, and topography. State and federal fire agencies operate in alignment with landscape level maintenance of the forest, exchanging areas of responsibility to meet needs during fires. Mechanisms are in place through the California Cooperative Fire Management and Stafford Act Response Agreement (CFMA) to respond across the landscape level, specifically through the Central Sierra Annual Operating Plan. This agreement consists of the Forest Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service as well as the State of California. The CFMA allows for personnel and facilities exchange, services, and information and funding exchanges between agencies for disaster response, facilitating inter-agency responses to landscape scale phenomena like bark beetle and wildland fire.



**Figure 2.** Overviews of regional land use and management complexity as a function of boundaries between federal, state, tribal, and private land holders.

Fires are continually getting more destructive, burning later into the year, and covering greater acreages than in decades past. [Figure 2](#) highlights variations in the extent of the bifurcated portions of The Monument that have burned. The northern half, with intertwined boundaries with the Sequoia National Forest and Sequoia-Kings Canyon National Parks, was extensively burned, to approximately 50% of the full area, by the Rough fire of 2015. The southern portion has burned less, comparatively, with its most considerable impacts from the Pier Fire, and along the eastern boundary in the McNally fire in 2002. Both the Pier and McNally Fires burned in the steep river canyons of the Kings River and Kern River, respectively. The natural river canyon boundaries also operate as jurisdictional and governance boundaries contributing to operational and managerial complexity.

As demonstrated by the Pier Fire in 2017, fires will not stop at state or federal or sovereign boundaries, nor do they stop at the boundary of a grove. Along the southern extent of the fire, some areas had not burned in nearly 100 years. The Pier fire burned over 30,000 acres and led to closures of county parks, roads, and trails within the Sequoia National Forest, and burned into the Tule River Nation (Inciweb [2017](#)). Restoration, in addition to response, requires a holistic, landscape level approach.

When addressing individual biological components such as indicator species and their relationship to fire, it is critical to consider species mobility. Scientists debate assisted migration and the benefits and detriments associated with “helping” a species move beyond the extent of their current bounds. A small, nimble Pacific Fisher can shift its range naturally to adjust to a changing climate. What about giant sequoias, massive and immobile individuals, whose success is dependent on external factors from water

availability to the degree of slope their cones may roll down? The giant sequoia “goldilocks zone” ranges from 4,500 feet to 7,050 feet on the western slopes of the Sierra Nevada with low elevations to the north and higher latitudinally south, and they are particular about soil constitution, water availability, and openness of surrounding canopy (Habeck 1992). Managers have few, if any, viable options for counteracting the effects of these shifting climatic envelopes. Mature sequoias cannot be transplanted upslope to colder conditions. Seedlings planted at higher elevations in an attempt to start new groves face underdeveloped soils with generally lower water-holding capacities (Huntington et al. 1985).

Giant sequoia, like their redwood coastal cousins, are prime candidates for assisted migration due to slow rates of successful reproduction, fire-mediated serotiny (the role of fire in catalyzing the germination process), and low vagility (or ability to self-disperse) (Jenkins and Jenkins 2017). Recognizing this opportunity, the federal government, scientists, private industry, and the general public have begun to act. Strategic partnerships, such as those between Sierra Pacific Industries and the Forest Service and other agencies, have led to planting seedlings in previously harvested areas of forest as well as seed bank contributions.

For giant sequoia trees, independent of management agency, there has been an emphasis on education and scientific understanding along with the prioritization of fire management to protect existing trees. The National Park Service prioritizes assisted migration as low, while plans for seed collection and assisted migration began experimentally in 2015 with medium priority (National Park Service 2017). Adjacent to The Monument, the Sequoia and Kings Canyon National Parks have identified 45 management objectives for giant sequoias and their associated ecosystems ranging from low to high priority. Conflicting temporal scales may be driving the deemphasizing of assisted migration. Giant sequoias grow slowly, while wildfires in drought-stricken landscape burn fast. While there are unresolved values-based discussions on the role of human intervention to save a species through assisted migration, there is also an emphasis on the essential need to continue “acting in spite of uncertainty” in the era of global change, species loss, and adaptation that we live in (Stephenson 2014).

### ***Management Scale, Land Ownership, and Recreational Impact***

Human factors also drive the management scale of The Monument, in addition to ecological. Exogenous forces including increased visitation, changes to the landscape driven by inholdings, and increased pressures of exurban development and recreation contribute to the necessity of management at the landscape level.

The Monument features recognizable checkerboarding from 19th-century land grants now known as inholdings (Nie and Miller 2010). These parcels are privately owned property carved out of 640-acre sections, initially through homestead, railroad, or other types of land grants. Inholding communities, such as Camp Nelson, feature both long term residents and increasingly absentee ownership. Management misalignments arise between the federal oversight of the National Forest and Monument encompassing inholdings. Peripheries of inholdings are subject to the available protection of the Forest Service, while state and local laws govern inholdings (Sax 1976). These small remote

communities are not affordable nor efficient for state and local fire agencies to manage, which leads to the trading of responsibilities between varying-scale state and federal agencies under cooperative agreements. While agencies trade jurisdictions to ensure optimum response times and coverage, this means nothing for the private year-round landholder if an absentee owner neighbor does not maintain defensible space and puts other neighbors at risk (Chase and Siegel 2012). Inholdings may introduce multiple detrimental impacts to their surrounding public lands including pets which may disturb forest wildlife and alterations to runoff causing soil degradation, pollution, and altered fire regimes. Checkerboard patterns create complex boundaries between public and private lands and their associated lawscapes and contribute to habitat fragmentation, a significant threat to ecosystems (Fahrig 2003).

It can be difficult for visitors to estimate boundaries in the complicated outlines of The Monument, inholdings, various special management and wildlife areas, adjacent National Parks, and surrounding National Forests. Unlike Devils Postpile National Monument where condensed boundaries enclose the 798-acre area of interest, Giant Sequoia National Monument's namesake, the sequoias themselves, are scattered in dozens of groves across vast swaths of land in two noncontiguous portions. Unlike the dramatic ascent into the Giant Forest in Sequoia National Park where the highway and its accompanying signage winds through rolling grasslands, oak woodlands, and finally under the dark canopy of giant sequoias, the approach to The Monument is rather uneventful and poorly marked. Complicated physical boundary delineation contributes to broader issues within The Monument including insufficient wayfinding and transportation networks. In the northern portion of The Monument, signage has a National Park Service influence and utilizes familiar route naming as visitors transition between Monument, Forest, and Park and back again. The complicated boundaries and wayfinding issues are summarized by the Yelp review "You wouldn't know it if you were there!"

In a multiple-use landscape, visitors engage in a wide variety of activities from dog walking to picnicking, which often overlap with where other activities are permitted. Though in areas with unclear signage or poorly understood lawscapes, such as The Monument, visitors are left wondering what they can do, and where. Traditional outdoor activities and associated rules for forest, monument, or park, have increasingly restrictive levels of permissibility. Picnicking, a low impact activity, is restricted the least across the three categories of public land. The rules for various activities do not increase proportionally to the potential for landscape level disruption. The rules are an agglomeration of lawscapes and governance models, with seemingly trivial actions such as collecting entirely not permissible in parks, and only one or two items allowable in forests and monuments. Sportsman based activities of hunting and fishing adhere to the laws of the State of California, though hunting in parks is entirely not permitted, while fishing is acceptable. As noted in Table 1, there are many nuances which visitors must be mindful of, including access to these activities and the activity of access as an end unto itself, whether motorized or otherwise.

During an unstructured conversation with the landholders, one owner lamented the formation of The Monument and the loss of access to off-highway vehicle (OHV) recreation routes. Mileage tallies support the anecdotal sentiments of loss and frustration.

**Table 1.** Giant Sequoia—forest, monument, or park? Restrictions on permitted land use and recreational activities vary across governance regimes.

	Monument	National forest	National park
Dog walking	Permissible on trails, with <6-foot leash	Permissible on trails, with <6-foot leash	Permissible in developed areas “Paws on Pavement!”
Fishing	Anywhere in accordance with California Department of Fish and Wildlife Laws	Anywhere in accordance with California Department of Fish and Wildlife Laws	Anywhere in accordance with California Department of Fish and Wildlife Laws
Campfires	Permits required for areas outside of campgrounds and picnic areas	Permits required for areas outside of campgrounds and picnic areas	Permissible in fire grills and some picnic areas only
Off-highway vehicles	On paved and unpaved roads only. Two designated trails in the KRSMA	On designated trails and roads	Not permissible
Picnicking	No restrictions	No restrictions	No restrictions
Firewood cutting	Permissible but varies by Ranger District	Permissible but varies by Ranger District	Not permissible
Collecting	One or two items for personal use	One or two items for personal use	Not permissible
Camping	In campgrounds or near roadsides, seasonal variation outside of campgrounds	In campgrounds or near roadsides, seasonal variation outside of campgrounds	In numbered, designated sites only, or quota-based wilderness permit
Bicycling	On designated trails and roads. Varies by trail	On designated trails and roads. Varies by trail	Bikes on roads and paved designated paths only
Hunting	Anywhere in accordance with California Department of Fish and Wildlife Laws	Anywhere in accordance with California Department of Fish and Wildlife Laws	Not permissible

Indicated above are activities commonly associated with recreating outdoors. As expected, the “Land of Many Uses” has the largest collection of least restrictive regulations. The Monument is a middle ground and the National Park system is an extremely restrictive environment. Per USDA Forest, Monument, or Park flyer, with supplemental information from USDA Forest Service Websites.

The creation of The Monument included 196 miles of developed trails for recreating, only 3.8 miles of which allow off-highway vehicles. OHV riders may use *roads* within The Monument, which tally approximately 450 miles between the two portions. The 3.8 miles, only 2% of the trails within the Monument, are located within the Kings River Special Management Area (KRSMA) along the northern boundary of the Northern Portion of The Monument. The Sierra National Forest manages the adjacent KRSMA. These trails were grandfathered in during the formation of the Monument due to Public Law 100-150, passed in 1987 (USDA Forest Service 2012a). OHV enthusiasts were granted virtually unlimited access to the entirety of overland routes in non-wilderness areas of the Sequoia National Forest prior to the creation of The Monument. The creation of the Monument has funneled OHV users and their associated impacts into designated corridors, at the expense of OHV users’ prerogative to explore. There is a reduction in the overall accessible extent of forest lands for an increase in distance of roads more suited for guided exploration, a managerial effort undertaken to offset visitation pressure.

The variety of ecosystem services, particularly recreation, available within The Monument is part of an interdependent greater recreation unit where individual components place pressure on each other (Felipe-Lucia et al. 2015). Unfettered cultural recreation ecosystem services impact supporting, regulating, and provisioning ecosystem services including carbon sequestration and water quality. Two major rivers flow through The Monument; the Kings River in the north and the Tule River in the south.



These flows that begin in the High Sierra energize hydro generation plants, are fished out of at mid and lower elevation, hydrate ranches through historic water rights, and are diverted through thousands of miles of irrigation canals for use in California's Central Valley agriculture (McFarland and Tufenkjian 2009). The California Department of Fish and Game, which oversees hunting in the Sequoia National Forest and The Monument, allows hunting with appropriate permitting and adherence to state laws within designated seasons (Department of Interior 2017). The intersection of Monument, Forest Service, and National Park Service lands just south of the turnoff to Hume Lake is a popular destination for recreationists, perhaps because it offers access to the best of all recreational lawscapes. A pickup truck bed with six hunters waited in full camouflage at Forest Service Road 15S03, mere yards from the boundary to Sequoia National Park and non-Monument Forest Service land to the east, demonstrated the popularity of this literal and figurative crossroads. Facilitating visitation beyond the interface of these jurisdictional boundaries in order to consume the scenery, ecological features, and geological grandeur of the landscape along a guided path provides a useful counterpoint.

There has been a significant effort from the self-proclaimed Mighty 190 working group, a grassroots multi-community collaboration to increase visitation to the area, to open Highway 190 and County Highway M60 in the southern portion of The Monument to year-round access. The Mighty 190 working group is modeling their attempt on the popularity of the Generals Highway, Highway 198, that loops through Sequoia and Kings Canyon National Parks. These looped highways are a popular draw for out of area visitors who combine them into a multiday adventure including popular destinations such as Yosemite to the north. While the Mighty 190/M60 is open in the summertime, it is efficient to loop through The Monument and stop at heavily trafficked hotspots including the Trail of 100 Giants, mere feet from the road, or easily drive into the access road to Dome Rock and hike up to breathtaking views without breaking a sweat. This "doing the loops" begs the question, is The Monument a windshield wilderness (Abbey 1968; Louter 2009)? Visitors route along the two circular paths, conveniently able to step out of the comfort of their vehicle at easily accessible sites to snap photos. Passive observers can trade off a maximum number of sites seen in a minimum amount of time, rather than spend a significant amount of time to reach one major site off the beaten path. Even the Forest Service Activities webpage specifically advertises Scenic Driving as a recreation category, highlighting Kings Canyon Scenic Byway, Generals Highway, and Sherman Pass Road as "spectacular landscapes" efficiently viewed from the car window. The Forest Service's Scenery Management System (SMS) mandates managing both the Generals Highway and Western Divide Highway (the Mighty 190) for esthetics and Scenic Integrity (USDA Forest Service 2012b). Desired scenic integrity and esthetics for designated Scenic Routes in The Monument include open vistas, distinctive ridges, and geologic features, as well as views down into the Great Central Valley. Per The Monument's Special Report on Scenery Management, densely forested areas that have missed burn cycles are considered a management challenge to be overcome.

Unique experiences and expectations based on things people have heard, seen, or read over the years leading up to a first visit to The Monument shape visitor

perceptions (Brady 2003). First-time visitors may anticipate esthetics influenced by photographs from a family member's prior visit or a mental picture composed from reading literature about a location. Those who are not familiar with the ecological necessity of naturally occurring fire for appropriate forest conditions may be dissatisfied with the esthetics of a burned forest. As a contested landscape, constituents of various user groups situate their desired esthetics within past economic realities, underlying epistemological constructs, and experiential knowledge; equating what the forest ought to be for all with what it was for one in a bygone era and different way of knowing (Jenkins 2018).

## Conclusion

We have reviewed the historical evolution of giant sequoia management from that of object at the grove level to part of a greater ecosystem at the landscape scale to show how dynamic, social and ecological phenomena emerge in conjunction with broader forest restructuring, and subsequent scale-dependent feedbacks. In the southern Sierra Nevada these coupled human and natural system components include multi-jurisdictional ownership, development throughout the wildland-urban interface, increased visitor use levels, wildland fire, impacts to ecosystems, fragmentation of landscapes, changing climatic ranges, and esthetic perceptions of how landscapes ought to look for what types of use and access. These phenomena may initially be understood through the regional ecotransformation of the Sierra Nevada economies and ecologies from extractive to amenity-driven land use value, however the present day challenges of climate change and development facing public lands managers exceeds simple bifurcations of society then and now. Rather, management must consider global climatic change and economic affluence that continue to drive large-scale ecological shifts and increases in visitation, and the budgetary constraints and agency mandates that further limit a unit's capacity to adapt. Scale mismatches are contradictions over time, and uncertain future trajectories, and across spatial scales, global to regional and site-specific (Cumming et al. 2013). Thus, adaptive capacity is greatest when institutions can transcend both spatial and temporal scale through attention to historical sensitivities, social learning, and organizational flexibility. No one land management designation or scale is more likely to succeed over another without consideration of other approaches and scales that must necessarily be integrated to address multi-scalar and contextual phenomena.

Is then the best approach to be asking simply national forest, national monument, or national park? Probably not. Rather, we must ask at what scale and in what context is the forest system best managed for the giant sequoia? The region and the landscape processes that constitute it offer a managerial meso-scale that accounts for hierarchical phenomena as drivers of change and nested feedbacks loops, both of which can help reduce uncertainty and anticipate outcomes. But in what agency context is the landscape best managed, with a utilitarian, visitor use, or preservationist mandate? Instead of thinking about one overriding agency directive – national forest, national monument, or national park – we must realize that the combination of all three, contiguous with one another across the landscape in perpetuity may be our best solution to hedge social, ecological, and economic risks. A co-management approach can help avert detrimental

outcomes for cultural, recreational, and ecological resource values between potentially competing agency directives of multiple use, recreational opportunity, and ecosystem preservation. The question of forest, monument, or park is instructive for managers as a means to educate the recreational public as has been done on interpretive signage across the Monument. But for the giant sequoia themselves there is value in a multi-sited approach where they occur on National Park, National Forest, Bureau of Land Management, and California State Parks lands. Across these land agencies a spectrum of managerial strategies are employed that allow for: public interaction and conservation promotion with these charismatic megafauna; varying levels of access, amenities, and infrastructure; fidelity to historic conditions; interventionist approaches with seedbanks and assisted migration; and selective thinning and prescribed burn regimes. The success of the giant sequoia as a species depends less on any one object or in a given land management unit, but rather on the co-management of processes throughout the region and the way in which this suite of inter-agency management approaches addresses the landscape as a system.

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