

Contracting for Control of Landscape-Level Resources

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ABSTRACT: Environmental governance increasingly focuses on public-private partnerships. We focus on contracting as a subset of the role of private actors governing landscape-level resources—such as wildlife habitats, scenic vistas, and firescapes—that exceed individual parcel sizes and are thus difficult for individual landowners to control unilaterally. Numerous contractual arrangements have emerged to exert coordinated control over landscape-level resources. We hypothesize that variations in laws and transaction costs, which are controlled largely by the homogeneity of landowner preferences across fragmented parcels, drive private control of landscape-level resources. In the absence of effective private control, government agencies may assume control of the landscape-level resources. A series of case studies discusses how law shapes the conditions that favor private contracting regimes of landscape-level resources, which highlight broader themes of law as a catalyst for new governance.

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The authors gratefully acknowledge the comments provided by George J. Busenberg, Robert Fischman, Christine Klein, Rhett Larson, Yael R. Lifshitz Goldberg, Troy Rule, and Eric Singer. We benefitted from the contributions by the participants of the Spontaneous Order and Emergence of New Property Systems of Property Workshop at New York University School of Law, the Politics and Economics of Wildfire Policy Conference at University of California, Santa Barbara, and the Junior Faculty Retreat at Arizona State University College of Law. We appreciate the research assistance provided by Lauren A. Ferrigni and library services provided by Beth DeFelice.

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I. INTRODUCTION

Policy discussions increasingly envision a role for private actors in a wide variety of governance contexts.¹ Growing awareness that industry actors and nongovernmental organizations play vital leadership roles in the development of law and policy call traditional notions of the government as a unilateral decisionmaker into question.² Environmental law is a particularly fertile ground for studying public-private approaches.³ Collaborative

1. See Kenneth W. Abbott & Duncan Snidal, *The Governance Triangle: Regulatory Standards Institutions and the Shadow of the State*, in *THE POLITICS OF GLOBAL REGULATION* 44, 70–71 (Walter Mattli & Ngaire Woods eds., 2009) (discussing standard bargaining and public-private governance arrangements); Orly Lobel, *The Paradox of Extralegal Activism: Critical Legal Consciousness and Transformative Politics*, 120 *HARV. L. REV.* 937, 983 (2007) (explaining that non-state actors play an important role in areas of management once thought to be controlled solely by state actors). See generally Jody Freeman, *The Private Role in Public Governance*, 75 *N.Y.U. L. REV.* 543 (2000) (emphasizing the role of private actors in administrative regulations); Eric W. Orts & Cary Coglianese, Debate, *Collaborative Environmental Law: Pro & Con*, 156 *U. PA. L. REV. PENNUMBRA* 289 (2007) (debating the proper role of private actors in determining environmental policy); R.A.W. Rhodes, *The New Governance: Governing Without Government*, 44 *POL. STUD.* 652 (1996) (noting a trend towards “new governance” approaches that emphasize the role of private parties).

2. See generally Freeman, *supra* note 1 (describing agencies and private organizations working together to resolve conflict).

3. Burgeoning literatures on topics including regulatory negotiation, new governance, bottom-up approaches, and insurers as regulators benefitted from early empirical studies in environmental law. See, e.g., WILLIAM D. LEACH, *CTR. FOR COLLABORATIVE POLICY, IS DEVOLUTION DEMOCRATIC? ASSESSING COLLABORATIVE ENVIRONMENTAL MANAGEMENT* 1 (2004) (proposing “a framework for assessing devolution in terms of inclusiveness, representativeness, procedural fairness, lawfulness, deliberativeness, and empowerment”); Jody Freeman, *Collaborative Governance in the Administrative State*, 54 *UCLA L. REV.* 1 (1997) (using examples from Occupational Safety and Health Administration (“OSHA”) and the Environmental Protection Agency (“EPA”) to argue current collaborative models are not ideal); Cameron Holley, *Aging Gracefully? Examining the Conditions for Sustaining Successful Collaboration in Environmental Law and Governance*, 26 *ENVTL. & PLAN. L.J.* 457 (2009) (investigating the factors that impact long-term success of corporate collaboration); Guy Mundlak & Issi Rosen-Zvi, *Signaling Virtue? A Comparison of Corporate Codes in the Fields of Labor and Environment*, 12 *THEORETICAL INQ. L.* 603 (2011) (examining motivations behind corporate social responsibility in the labor and environmental sectors); Haitao Yin et al., *Risk-Based Pricing and Risk-Reducing Effort: Does the Private Insurance Market Reduce Environmental Accidents?*, 54 *J.L. & ECON.* 325 (2011) (analyzing variations in financing of cleanup of accidental leaks from underground fuel tanks).

environmental governance⁴ and new governance⁵ approaches are increasingly evaluated for their flexibility and nimbleness in addressing complicated environmental problems.⁶

We focus on a specific subset of private governance of environmental resources: the use of contract. Contracts govern multiple natural resources on vast western landscapes. Any single land parcel is potentially subject to a multitude of contracts. Contracts governing landscape-level resources⁷ range

4. Collaborative environmental management is the topic of considerable discussion in environmental and natural resources law. See, e.g., Allyson Barker et al., *The Role of Collaborative Groups in Federal Land and Resource Management: A Legal Analysis*, 23 J. LAND RESOURCES & ENVTL. L. 67 (2003) (analyzing whether the framework for regulating public land accommodates work by collaborative groups); Lee P. Breckenridge, *Nonprofit Environmental Organizations and the Restructuring of Institutions for Ecosystem Management*, 25 ECOLOGY L.Q. 692 (1999) (examining changing roles for nonprofits and implications thereof for research management); Alejandro Esteban Camacho, *Mustering the Missing Voices: A Collaborative Model for Fostering Equality, Community Involvement and Adaptive Planning in Land Use Decisions, Installment One*, 24 STAN. ENVTL. L.J. 3, 56–65 (2005) (arguing current types of negotiated land use regulations lead to inefficient and inflexible outcomes in the long run); Timothy P. Duane, *Community Participation in Ecosystem Management*, 24 ECOLOGY L.Q. 771 (1997) (using case studies from California to examine ecosystem management and community involvement); Cameron Holley, *Removing the Thorn from New Governance's Side: Examining the Emergence of Collaboration in Practice and the Role for Law, Nested Institutions, and Trust*, 40 ENVTL. L. REP. 10656 (2010) (examining case studies to evaluate what conditions must be present for successful collaboration); Robert A. Kagan, *Political and Legal Obstacles to Collaborative Ecosystem Planning*, 24 ECOLOGY L.Q. 871 (1997) (discussing obstacles that prevent effective collaborative ecosystem management); Bradley C. Karkkainen, *Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism*, 21 VA. ENVTL. L.J. 189 (2002) (addressing the trends in collaborative governance at the ecosystem level); Lawrence Susskind et al., *Collaborative Planning and Adaptive Management in Glen Canyon: A Cautionary Tale*, 35 COLUM. J. ENVTL. L. 1, 2–3 (2010) (discussing policy developments to include non-stakeholders in regulatory developments).

5. See, e.g., Karen Bradshaw Schulz, *New Governance and Industry Culture*, 88 NOTRE DAME L. REV. 2515 (2013) (using examples from the domestic forest industry to evaluate the emergence of new governance); Cameron Holley, *Facilitating Monitoring, Subverting Self-Interest and Limiting Discretion: Learning from "New" Forms of Accountability in Practice*, 35 COLUM. J. ENVTL. L. 127 (2010) (evaluating effectiveness of various kinds of accountability under new governance regimes); Bradley C. Karkkainen, *Information-Forcing Environmental Regulation*, 33 FLA. ST. U. L. REV. 861 (2006) (applying the theory of "penalty default" as a basis for collaborative environmental guidance); Michael B. Runnels & Andrea Giampetro-Meyers, *Cooperative NRDA & New Governance*, 77 BROOK. L. REV. 107 (2011) (suggesting methods to inform the natural resource damage assessment ("NRDA") process based on new governance principles); Michael P. Vandenberg, *Private Environmental Governance*, 99 CORNELL L. REV. 129 (2013) (examining the roles and development of private governance); Annecoos Wiersema, *A Train Without Tracks: Rethinking the Place of Law and Goals in Environmental and Natural Resources Law*, 38 ENVTL. L. 1239 (2008) (arguing new governance institutional models may not adequately protect all values at stake environmental regulation).

6. Orts & Coglianesse, *supra* note 1, at 290–94 (2007) (noting that collaborative environmental governance offers flexibility and nimbleness relative to other governance approaches).

7. We refer to landscape-level resources as those that exceed the scope of individual parcels of land and hence are beyond the control of a single landowner. Examples include groundwater

from oil and gas extraction to exploitation of mineral rights, reciprocal use of private roads to conservation of endangered species. Yet, we know little about the conditions under which contractual regimes are likely to emerge, and even less about their substantive content or normative desirability.

The need for contract—or some form of governance arrangement—to control landscapes emerges from tension between manmade property divisions, such as land parcels, and natural resources.⁸ Legal discussion about land operates almost exclusively through the construct of property, in which land is divided and owned.⁹ Chopping land into neat bundles serves human purposes by reducing conflict and encouraging investment through the establishment of entitlements and boundaries. However, the property paradigm that divorces land from landscapes also imposes costs on those seeking to govern large-scale natural resources that cannot be constrained into neatly defined lines.¹⁰ As a result, areas of shared public–private control emerge.¹¹

Landscape-level resources are often imagined to be controlled almost entirely by agencies operating under state and federal laws.¹² Yet, the majority of American lands, and the natural resources upon them, are privately owned. Effective resource management thus requires participation by private parties. Land itself is managed on a parcel-by-parcel basis, but resources can seldom be effectively managed, exploited, or conserved in the same way. Synergistic uses produce more effective resource outcomes than competing or conflicting uses on a parcel-by-parcel basis. Transaction costs subsume small-

aquifers, floodplains, oil and gas reservoirs, river basins, wildlife habitats, scenic vistas and geological formations, and wildfire landscapes.

8. Joseph Sax argues that Justice Scalia's opinion in *Lucas v. South Carolina Coastal Council*, 112 S. Ct. 2886 (1992), signals that "leaving land in its natural condition is in fundamental tension with the traditional goals of private property law." Joseph L. Sax, *Property Rights and the Economy of Nature: Understanding Lucas v. South Carolina Coastal Council*, 45 STAN. L. REV. 1433, 1441 (1993); see also Anthony B. Schutz, *Toward a More Multi-Functional Rural Landscape: Community Approaches to Rural Land Stewardship*, 22 FORDHAM ENVTL. L. REV. 633, 650–51 (2011) (noting that although the legal construct of property has benefits, it also has negative consequences for wildlife diversity and economies of scale).

9. For a discussion of the narratives surrounding property, see CAROL M. ROSE, PROPERTY AND PERSUASION: ESSAYS ON THE HISTORY, THEORY, AND RHETORIC OF OWNERSHIP (1994); Nicholas Blomley, *Landscapes of Property*, 32 LAW & SOC'Y REV. 567, 568–69 (1998).

10. Natural resources scholars have long described the tension between land demarcations for the allocation of property and goal of large landscapes for goals such as wildlife diversity. Schutz, *supra* note 8, at 650–51 (noting that although the legal construct of property has benefits, it also has negative consequences for wildlife diversity and economies of scale).

11. One can imagine these areas of overlapping public–private control as a form of semi-commons. See generally Lee Anne Fennell, *Commons, Anticommons, Semicommons*, in RESEARCH HANDBOOK ON THE ECONOMICS OF PROPERTY LAW 35 (Kenneth Ayotte & Henry E. Smith eds., 2011); Henry E. Smith, *Semicommon Property Rights and Scattering in the Open Fields*, 29 J. LEGAL STUD. 131 (2000).

12. This is often involved but not true in other places and not always in the same way—e.g., Europe with parks, South Africa with wildlife, and Australia with fire.

scale attempts to monetize resources. Conservation, preservation, recreation, and wildlife resource management operate best when there is a single, cohesive landscape-level management approach. The need for coordination among private actors gives rise to private bargaining, which can be understood in part as a system of private ordering.¹³ Private bargaining leading to contractual arrangement is one form of governance for landscape-level resources crossing multiple property lines.¹⁴

We examine how laws, landowner-resource-use preferences, and transaction costs affect the choice of a governance mechanism to manage landscape-level resources. We provide an overview of several areas in which contractual arrangements govern resource management, including: groundwater, oil and gas, wildlife, marine fisheries, scenic landscapes, and conservation. Then, we turn towards exploring the conditions under which private contracting emerges.¹⁵ A series of case studies of the various contractual arrangements used to manage wildfire illustrate that the homogeneity of resource use among landowners, low transaction costs, and laws that favor individualistic outcomes promote the use of contracting as a resource-management tool. These observations suggest that contracting is most difficult when land is fragmented and land uses are heterogeneous among landowners. Yet, this is precisely the setting in which the use of contract can be most important to effective resource use and conservation. We conclude by suggesting that law can promote contracting under such conditions through agencies coordinating agreements among disparate landowners.

We proceed as follows. Part II overviews the legal regimes controlling American land disposition and resulting control over landscape-level resources. Part III provides an overview of the relative roles of law and contract in governing a variety of natural resources. Part IV examines the effect of land use homogeneity, transaction costs, and laws that have shaped contractual arrangements with regard to the resource of wildfire. A series of case studies illustrates the variety of contractual arrangements that can emerge to govern landscape-level resources. Part V suggests that contributing to the relative

13. See F.A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519, 524–27 (1945) (discussing how limited knowledge of relevant facts impact actors in the market).

14. Our focus is on resources that span multiple property lines, and the arrangements among landowners to control those resources. There are, of course, parcel-specific contractual arrangements, such as easements or timber sales involving a particular tract of land, which may be unilaterally entered into by a single landowner. For a discussion of the potential for private ordering to give rise to positive outcomes in natural resource contexts, see Elinor Ostrom & Xavier Basurto, *Crafting Analytical Tools to Study Institutional Change*, 7 J. INSTITUTIONAL ECON. 317, 319 (2010) (suggesting that resource users may achieve better economic and equitable outcomes in managing resources relative to top-down resource management).

15. We leave several vital questions unanswered. There is much to be done in studying the efficiency of contracting relative to other forms of governance, the inclusiveness of contracting of stakeholders not party to the agreement, and the general normative desirability of contracting—and public-private partnerships generally—relative to traditional, state-centered governance regimes.

degree of government versus private control depends, at least partially, on the heterogeneity of the parties, the initial allocations, and the value of resources. Part VI briefly concludes.

II. LANDSCAPE GOVERNANCE

A. CONTRACT AS A MECHANISM FOR PUBLIC–PRIVATE ENVIRONMENTAL GOVERNANCE

Environmental governance is increasingly characterized by public–private approaches, in which state actors collaborate with non-state actors to decide how to use and conserve resources.¹⁶ New governance and collaborative environmental management literatures are increasingly focused on evaluating whether public–private partnerships are more inclusive and effective than top-down government control of resources and resource use.¹⁷

Examples of expanded roles for private actors within environmental law abound. Bottom-up approaches to resource management emphasize governance by users, who presumably have superior knowledge of resource conditions relative to bureaucrats.¹⁸ The role of private insurers in creating risk-based pricing reduces accidental environmental harm by prompting owners to replace equipment.¹⁹ Agency engagement with stakeholders early in rulemaking processes can reduce the risk of litigation and enhance the amount of information on which rules are based.²⁰ In sum, environmental governance is increasingly envisioned as premised upon shared roles and responsibilities for public and private actors.

The mechanisms for achieving public–private control vary. Sustainability certifications,²¹ communal ownership regimes,²² and stakeholder involvement in non-judicial dispute resolution processes²³ provide a few examples of available techniques. This project focuses on a particular mechanism for facilitating public–private partnerships: contracts. Contractual control over

16. See Holley, *supra* note 3, at 459; Mundlak & Rosen-Zvi, *supra* note 3, at 606–07 (“The world of regulation has undergone a major transformation over the last four decades, from the traditional state-centered ‘command and control’ regulation of the 1970s to market-based instruments (still marshaled by the state) that characterized the turn of the century, and then to the various types of new governance mechanisms that are in vogue today.”).

17. LEACH, *supra* note 3, at 459.

18. Neil Gunningham, *The New Collaborative Environmental Governance: The Localization of Regulation*, 36 J.L. & SOC’Y 145, 147 (2009); Ostrom & Basurto, *supra* note 14, at 319.

19. See Yin et al., *supra* note 3, at 333–34, 354–55 (finding that the risk-based pricing common in private insurance markets but rare in government assurance programs mitigates the moral hazard problem for underground fuel tank owners to close or replace leak-prone tanks prior to costly accidents).

20. See generally Freeman, *supra* note 3 (discussing the regulatory negotiation process).

21. See generally Bradshaw Schulz, *supra* note 5.

22. Ostrom & Basurto, *supra* note 14, at 319.

23. Carrie Menkel-Meadow, *Getting to “Let’s Talk”: Comments on Collaborative Environmental Dispute Resolution Processes*, 8 NEV. L.J. 835, 848–49 (2008).

environmental metrics and natural resources can be used for private disposition, use, management, and conservation of resources.

Contracts are often overlooked as a tool for creating public–private partnerships for environmental governance. Unlike rulemaking, contractual arrangements—including those that agencies enter into with private parties—rarely involve notice in the Federal Register or public notice and comment periods. Contracts are seldom stored in central, publically accessible repositories, and may be subject to confidentiality provisions. Contracts between private parties alone—as among a group of landowners, or between a landowner and insurer—are more secretive and less accessible still.

Despite being frequently overlooked, contracts play a crucial role in governing landscapes. Contracts are relatively easy to form, inexpensive, durable, and subject to reduced scrutiny relative to other governance techniques.²⁴ Contracts can involve a single parcel of land or many parcels of land in a particular geographic area. Further, contracts can be solely private in nature (as between private landowners) or include both public and private entities (as with a contract between an agency and adjacent private landowner). For reasons outlined below, we focus specifically on contractual arrangements designed to control landscape-level resources.

B. LANDSCAPE-LEVEL RESOURCES

Imagine the owner of a small mountain cabin on a one-acre parcel of land. She values waking up to a beautiful mountain view and a taking a long hike each day. The value the cabin owner derives from her land is dependent upon the landscape-level resources of scenic viewsheds and recreation. Because her individual parcel is too small to provide these resources, the landowner depends upon synergistic uses of adjacent parcels. This landowner's preferences would likely be satisfied if she lived adjacent to a national park—a large public landholding devoted to scenic and recreational uses. The cabin owner would be disappointed, however, if landowners engaging in commercial timber harvest, which conducted large, noisy logging operations and strictly enforced property boundaries against trespassers, owned the adjacent parcels.

24. This is not to say that contracts are a perfect form of governance. The very factors that incent parties to enter into contract—fewer parties to consider, lack of public participation, secrecy—raise concerns about stakeholder participation and environmental justice. These concerns are heightened in contracts entered into by agencies. Jody Freeman, *The Contracting State*, 28 FLA. ST. U. L. REV. 155, 214 (2000) (discussing the dangers of government contracting as including “legislative abdication of responsibility and fragmented accountability”); see also Henry N. Butler & Nathaniel J. Harris, *Sue, Settle, and Shut Out the States: Destroying the Environmental Benefits of Cooperative Federalism*, 37 HARV. J.L. & PUB. POLY 579 (2014) (describing settlements between the Environmental Protection Agency and environmental nongovernmental organizations as shutting out the states from important policy decisions).

Property law has long acknowledged that conflicting land uses can diminish the utility each landowner derives from her land.²⁵ Competing uses of natural resources can also lead to conflict.²⁶ Competition can arise over use of a single resource, as with many farmers who each want a large share of water from the same river for their crops. Competition also arises over deciding which among many resources overlapping a single landscape should be maximized.²⁷ Examples of conflicting natural resource uses abound. Snowmobiling—a popular and lucrative use of the recreational resource—conflicts with preservation, conservation, and wildlife resources. Conversely, protecting the wildlife resource through the designation of critical habitat through the Endangered Species Act may hamper commercial resource extraction, such as mining or timber operations.

Overcoming natural resource conflicts can reduce resource waste, produce scientific advantages to plant and animal species,²⁸ and reduce the transaction costs associated with resource exploitation by creating economies of scale. Maximizing the value of the natural resources on one's own land often benefits from having neighboring landowners who share similar approaches towards natural resources, such as a preference for use over conservation, or vice versa. Although the land parcels remain distinct, resource uses may be grouped across parcels to garner the benefits of synergistic resource uses.²⁹ Neighboring landowners are unlikely to complain

25. See *Spur Indus., Inc. v. Del E. Webb Dev. Co.*, 494 P.2d 700, 706 (Ariz. 1972) (en banc); Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1115–16 (1972).

26. A non-exhaustive list of natural resources includes: timber, recreation, preservation, mining, etc. Although natural resources are innately connected to land, they often remain distinct from the land itself.

27. Many natural resources overlap the same parcel of land, leading to the need to manage multiple uses simultaneously. For a discussion of multi-use land management, see generally Michael C. Blumm, *Public Choice Theory and the Public Lands: Why "Multiple Use" Failed*, 18 HARV. ENVTL. L. REV. 405 (1994); George Cameron Coggins, *Of Succotash Syndromes and Vacuous Platitudes: The Meaning of "Multiple Use, Sustained Yield" for Public Land Management*, 53 U. COLO. L. REV. 229 (1982); George Cameron Coggins, *The Law of Public Rangeland Management IV: FLPMA, PRIA, and the Multiple Use Mandate*, 14 ENVTL. L. 1 (1983); George Cameron Coggins & Parthenia Blessing Evans, *Multiple Use, Sustained Yield Planning on the Public Lands*, 53 U. COLO. L. REV. 411 (1982); Robert L. Glicksman, *Sustainable Federal Land Management: Protecting Ecological Integrity and Preserving Environmental Principal*, 44 TULSA L. REV. 147 (2008); Robert L. Glicksman, *Wilderness Management by the Multiple Use Agencies: What Makes the Forest Service and the Bureau of Land Management Different?*, 44 ENVTL. L. 447 (2014); Scott W. Hardt, *Federal Land Management in the Twenty-First Century: From Wise Use to Wise Stewardship*, 18 HARV. ENVTL. L. REV. 345 (1994); Jan G. Laitos & Thomas A. Carr, *The Transformation on Public Lands*, 26 ECOLOGY L. Q. 140 (1999).

28. Sarah Jane Keller, *Landscape-Scale Conservation Gains Ground*, HIGH COUNTRY NEWS (Nov. 15, 2014), http://www.hcn.org/articles/landscape-scale-conservation-gains-ground?utm_source=wc1&utm_medium=email (noting that consolidating parcels into landscape-level holdings "should also make managing ecosystems to sustain at-risk species like spotted owls, grizzly bears or lynx less challenging").

29. We are unaware of an empirical project assessing the extent to which resource uses are grouped across land, although we posit that such groupings may be likely because of the

about noisy chainsaws if they, too, are harvesting timber. Use-driven landowners garner economies of scale, which they could not realize independently, from shared infrastructure.³⁰ Shared geographical proximity of many resource users allows for consolidation of efforts to defend against laws restricting resource use and lobbying government for favorable policies.

Conservation-driven landowners also accrue well-documented benefits from assembling resources across parcels. Environmental non-governmental organizations, such as the Nature Conservancy, are prioritizing land purchases that bundle historically fragmented land parcels into a single holding.³¹ Doing so provides organizations with the ability to manage wildfire at the landscape level.³² Wildlife requires thousands of acres of contiguous habitat. Recreational activities, like hiking or rafting, benefit from large swaths of land. Individual landowners clearly benefit from assembling resources into groupings larger than individual landholdings. Public goods, such as conservation or preservation, may also accrue when resources can be managed at the landscape level.

Coordinating complementary resource use at the landscape level requires, however, a coordinated approach across individual land parcels. Many natural resources, which we term “landscape-level resources,” extend over hundreds or thousands of acres. Landscape-level resources are often larger than individual private land holdings.

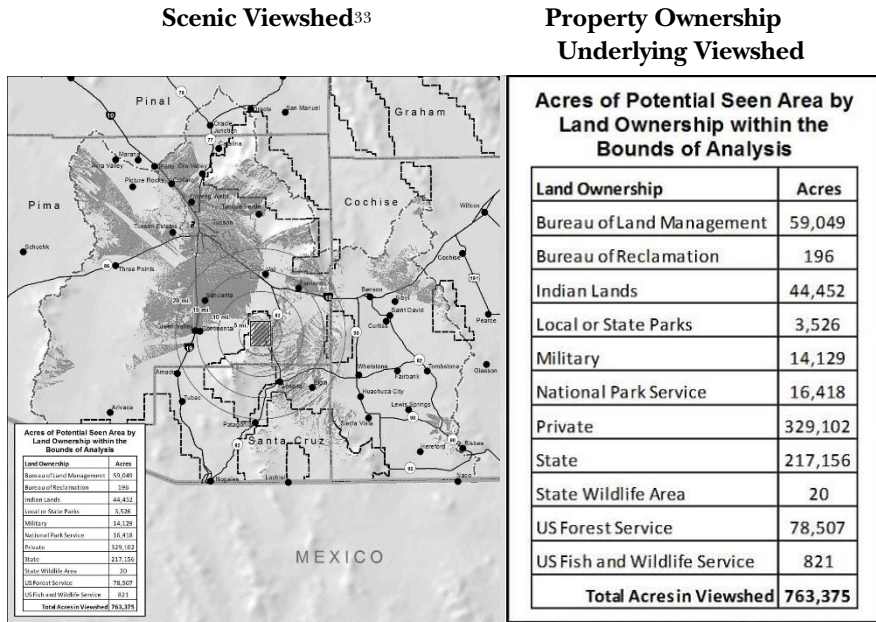
economic benefits that likely drive from the economies of scale of similar resource use across land parcels.

30. Bradshaw Schulz, *supra* note 5, at 2541 (noting that timber landowners enter into cooperative road sharing agreements and work together to prevent trespassing and put out wildfires).

31. Keller, *supra* note 28 (discussing a nature conservancy purchase of 47,921 acres of land in Washington and 117,152 acres of land in Montana).

32. *Id.* (“Having a cohesive plan for those lands will make it easier to do forest thinning or prescribed burns on a scale that could stave off catastrophic wildfires, for example.”).

Figure 1. Comparing the Single Landscape-Level Resource of a Scenic Viewshed with the Multiple Property Owners Underlying the Landscape-Level Resource



The majority of American lands are privately owned. Natural resources are typically, although not exclusively, bundled into ownership of the physical land parcel unless intentionally separated from it.³⁴ Landowners own the natural resources on their land, and—as a default, subject to restrictions outlined below—may use the natural resources on their land as they see fit. This sense of control over the land and resources on it is perhaps the most appealing aspect of property ownership: “complete master[ship], complete self-direction, and complete protection from the whims of others.”³⁵ Unilateral control sharply contrasts, however, with the economics of maximizing resource use.

Effective resource management typically requires consolidating control over landscape-level resources into a single unit of control that governs many

33. U.S. DEP’T OF AGRIC., DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE ROSEMONT COPPER PROJECT, app. D, at D-5 fig.D5 (2011), available at <http://www.rosemonteis.us/draft-eis>.

34. Rights to natural resources can often be severed from the land and sold separately from land title, as with subsurface mineral rights or conservation easements. Other resources, such as wind rights, cannot be severed from the land. See TROY A. RULE, SOLAR, WIND AND LAND: CONFLICTS IN RENEWABLE ENERGY DEVELOPMENT 54 (2014).

35. Carol M. Rose, *Canons of Property Talk, or, Blackstone’s Anxiety*, in LEGAL CANNONS 66, 69 (J.M. Balkin & Sanford Levinson eds., 2000).

individual landholders,³⁶ each of whom likely begins with varying views on the “best” use of their land and the resources on it. Absent single ownership of a large, uninterrupted parcel of land,³⁷ resources must be assembled to garner the benefits of landscape-level control.³⁸

Resource restrictions hampering landowners’ unilateral decisions to use, protect, or sell come from both public and private sources. Government regulation regularly affects the default ownership rule of control over natural resources on private land. Examples abound, such as laws preventing capture of wildlife or subjecting commercial timber harvest activity to environmental review. Regulation can also require that resources be used against a landowner’s protests, as with force-pull regimes that allow oil companies to extract oil over individual landowner objections.

Private regulation similarly impedes landowner discretion over the natural resources on private land. Today, many privately held lands are subject to legally cognizable non-ownership interest in the management of those lands, as with lenders holding land mortgages, insurers of the resources on the land, and shareholders of lands held by corporate forms. More broadly, the general public has a quasi-cognizable interest in the management of land, as with neighbors who seek nuisance abatement on land they do not own, local governments that zone land under police powers, and environmental nongovernmental organizations that seek to manage activities on privately owned land under the public trust doctrine.³⁹ Private

36. See *supra* Part II.A.

37. Sometimes a single landowner is so large that they exert unilateral private control over a landscape-level control. Public landholdings, such as national parks and national forests, are the most likely holders of such large parcels. Wealthy private landowners may also own enough land to provide the benefits of landscape-level resource control. Billionaire Ted Turner owns hundreds of thousands of acres of western land, and maintains a bison herd of 55,000, representing 11% of the world’s population of bison. Tracy Ross, *How Ted Turner Ended up with Yellowstone’s Most-Prized Bison*, TAKEPART (May 17, 2013), <http://www.takepart.com/article/2013/05/16/rancher-ted-turner-bison-meat-controversy>. Increasingly, environmental nongovernmental organizations are prioritizing landscape-level conservation over smaller efforts. See Mission and Values, AM. PRAIRIE RES., <http://www.americanprairie.org/aboutapf/mission/> (last visited Apr. 22, 2015).

38. Assembling natural resources into landscape-level units of control is, in many ways, analogous to assembly problem discussed by property scholars. See RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW § 3.5, at 43–44 (2d ed. 1977) (listing private solutions used to overcome assembly problems as including the use of buying agents, option agreements, and straw transactions); Daniel B. Kelly, *The “Public Use” Requirement in Eminent Domain Law: A Rationale Based on Secret Purchases and Private Influence*, 92 CORNELL L. REV. 1, 21–22 (2006) (discussing developers’ use of secret buying agents to conceal assembly from existing property owners who might otherwise strategically inflate their prices); Thomas W. Merrill, *The Economics of Public Use*, 72 CORNELL L. REV. 61, 74–75 (1986) (discussing the land assembly problem).

39. Matthew McKinney, *The Realities of Regional Stewardship: From Urban Issues to Natural Landscapes*, 29 PUB. LAND & RESOURCES L. REV. 123, 130 (2008) (noting that the “several land conservation organizations—including The Nature Conservancy and the Sierra Club—have recently started projects that seek to prioritize endangered landscapes”).

regulators—including merchant groups, nongovernmental environmental organizations, and insurers—exert considerable control over landscape-level resources.

Through the use of contracts—legally enforceable promises between parties—these groups govern landscape-level resources. Contracting for control of landscapes can take many forms: “land trusts, conservation easements, cooperative agreements on private lands,”⁴⁰ communal ownership with bottom-up management,⁴¹ sustainability certifications,⁴² or insurers as regulators.⁴³ In other words, private actors also constrain and guide the use of natural resources on private land.

Government action might be seen as the obvious mechanism for consolidating control over a natural resource at the landscape-level. The value of centralized control is well recognized in legal doctrines ranging from emergency control in the case of fire to the coercive state power necessary to construct “long and skinny” public-good-producing resources—such as highways and power lines.⁴⁴ Despite the frequent need for,⁴⁵ and benefits of, unilateral government control of landscape-level resources, there are limitations to this approach.⁴⁶ Further, shifting political priorities have historically contributed to land fragmentation, complicating the potential for contract to control landscape-level resources.

C. GOVERNMENT MANAGEMENT OF LANDSCAPES

Public land law historically fragmented ownership of landscapes and landscape-level resources with the goal of incentivizing rapid privatization of

40. Allison Jones, *The Importance of Connected and Conserved Landscapes in a Time of Changing Climate*, 3531 UTAH ENVTL. L. REV. 135, 145–46 (2011).

41. Ostrom & Basurto, *supra* note 14, at 319.

42. See generally Bradshaw Schulz, *supra* note 5.

43. See generally Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197 (2012); Haitao Yin & Howard Kunreuther, *Risk-Based Pricing and Risk-Reducing Effort: Does the Private Insurance Market Reduce Environmental Accidents?*, 54 J.L. & ECON. 325 (2011); Yin et al., *supra* note 3 (finding that the risk-based pricing common in private insurance markets but rare in government assurance programs mitigates the moral hazard problem for underground fuel tank owners to close or replace leak-prone tanks prior to costly accidents).

44. Richard A. Epstein, *What Is So Special About Intangible Property? The Case for Intelligent Carryovers*, in COMPETITION POLICY AND PATENT LAW UNDER CERTAINTY: REGULATING INNOVATION 42, 46–47 (Geoffrey A. Manne & Joshua D. Wright eds., 2014).

45. Richard A. Epstein, *How Spontaneous? How Regulated? The Evolution of Property Rights Systems*, 100 IOWA L. REV. 2341 (2015) (noting government control of natural resources is often needed).

46. One barrier is citizen resistance to state control. This summer, cattle ranchers—advocates for maximizing the grazing resource on public lands—mounted a well-publicized protest against grazing policies of the Bureau of Land Management. *The Cliven Bundy Standoff: Cowboys v Feds*, ECONOMIST (Apr. 26, 2014), <http://www.economist.com/news/united-states/21601298-misguided-insurrection-revives-old-debate-about-land-west-cowboys-v-feds>.

western lands.⁴⁷ As public values shifted towards preservation and conservation, laws were adopted to facilitate public ownership of land and government control over landscape-level resources. Contracting among private parties has remained a constant against the changing backdrop of law, facilitated to varying degrees by judicial and agency intervention. Today, a thicket of overlapping common law doctrines and statutes developed at the local, state, regional, and federal level governs landscape-level resources.⁴⁸ Relevant legal rules are derived from legislation, common law, and executive and agency controls.

1. Legislation

The Constitution authorizes Congress to govern public lands under the Property Clause.⁴⁹ Congressional control over natural resources is generally derived from the Commerce Clause.⁵⁰ Congressional priorities have shifted over time, but the laws governing public lands and natural resources are rarely repealed, leaving thousands of statutes on the books governing public natural resources.⁵¹

The fragmented ownership of the American landscape is largely the result of 19th century land-disposition policies designed to privatize western lands. After independence, the original colonies ceded land to the federal government. Congress passed a series of laws designed to control and privatize western lands, including rewarding war veterans with land grants and honoring grants made by previous governments during land acquisitions.

In 1785, the Land Ordinance created the survey system, dividing land into square townships—36 sections of one square mile (640 acres) each.⁵² In 1812, Congress created the General Land Office, which became responsible

47. Private parties, too, have incentives for dividing land into smaller ownership parcels. The focus on government land division in this section is largely about the timing of government land disposition, which was prior to the settlement of western lands and thus before governance institutions had time to develop. Consequently, local norms tended to develop (as with mineral claims and the rule of capture) and were later codified into law. We are indebted to Christine Klein for this observation.

48. 1 GEORGE CAMERON COGGINS & ROBERT L. GLICKSMAN, *PUBLIC NATURAL RESOURCES LAW* § 1:24 (2d ed. 2007) (describing statutory sections of public natural resource statutes as “obsolete, overlapping, conflicting, redundant, vague, or ambiguous”).

49. U.S. CONST. art. IV, § 3, cl. 2. (“Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States.”).

50. U.S. CONST. art. I, § 8, cl. 3; *see also* *Gibbs v. Babbitt*, 214 F.3d 483, 486–87 (4th Cir. 2000) (upholding a regulation limiting “the taking of red wolves on private land” under the Commerce Clause).

51. COGGINS & GLICKSMAN, *supra* note 48 (“[L]iterally thousands of statutes on the books are pertinent to public natural resources law.”).

52. GEORGE CAMERON COGGINS ET AL., *FEDERAL PUBLIC LANDS AND RESOURCES LAW* 51 (4th ed. 2001).

for public land surveying.⁵³ From 1862 to 1872, Congress granted railroad land in a checkerboard pattern, alternating railroad land with expected homestead plots.⁵⁴ Sections 16 and 36 in each township were allocated to the states, the proceeds of which were required to be used for public education.

Miners dug ore containing precious metal from government land without paying for the land or compensating the government for the ore.⁵⁵ Far from the reaches of Washington, D.C., miners created private rules governing possessory rights, which Congress eventually adopted into law⁵⁶ and the Supreme Court recognized as property rights.⁵⁷ The doctrine of congressional acquiescence in the mining cases expanded to include other natural resources, including water, grazing, and recreation.⁵⁸

Beginning in the late 1800s, congressional priorities shifted from privatization of western lands toward reserving large portions of land conservation.⁵⁹ Congress created national parks, authorized the President to withdraw national monuments⁶⁰ and wildlife refuges,⁶¹ and designated recreation areas.⁶² Approximately 170 million acres in the continental United States, unclaimed by homesteaders, were withdrawn into federal control and transformed into grazing districts.⁶³ The 1934 passage of the Taylor Grazing Act largely marked the end of disposition of land in the continental United States.⁶⁴ Most notably, Congress designated over 105 million acres of Alaska

53. Richard Teller, *The Public Land Surveys of the United States*, 18 ROCKY MTN. MIN. L. INST. 437, 462 (1973).

54. Union Pacific Act, ch. 120, § 3, 12 Stat. 489, 492 (1862).

55. *Forbes v. Gracey*, 94 U.S. 762, 763 (1877) (“Congress has, by statutes and by tacit consent, permitted individuals and corporations to dig out and convert to their own use the ores containing the precious metals which are found in the lands belonging to the government, without exacting or receiving any compensation for those ores, and without requiring the miner to buy or pay for the land.”).

56. *Id.* (“[Congress] has gone further, and recognized the possessory rights of these miners, as ascertained among themselves by the rules which have become the laws of the mining districts as regards [to] mining claims.”).

57. The Supreme Court held that mining claims “are property in the fullest sense of the word, and their ownership, transfer, and use are governed by a well-defined code or codes of law, and are recognized by the States and the Federal Government.” *Id.* at 767.

58. *COGGINS & GLICKSMAN*, *supra* note 48, §§ 4:28–4:32.

59. *Id.* § 2:10.

60. Antiquities Act of 1906, 16 U.S.C. §§ 431–433 (2012).

61. National Wildlife Refuge System Administration Act of 1966, 16 U.S.C. §§ 668dd–668ee (2012).

62. 16 U.S.C. §§ 460n–460rr–2.

63. E. LOUISE PEFFER, *THE CLOSING OF THE PUBLIC DOMAIN: DISPOSAL AND RESERVATION POLICIES 1900–50*, at 203–05 (Stuart Bruchey & Eleanor Bruchey eds., Arno Press 1972) (1951).

64. 43 U.S.C. §§ 315–315r (2012). The Desert Lands Act of 1877 remains in force as the only homesteading law still on the books. *Id.* §§ 321–339.

as public lands in 1980.⁶⁵ Each of these actions reflected a shift in law to preclude fragmentation and privatization of landscapes.

More recently, Congress has acted to exert federal control over landscape-level resources including wilderness,⁶⁶ rivers,⁶⁷ coastal zones,⁶⁸ air,⁶⁹ waterways,⁷⁰ and wildlife.⁷¹ Many of these laws exert federal control over resources that exist on privately held land. Recent legislation reflects shifts towards public-private approaches towards managing landscape-level resources. For example, Congress enacted the Collaborative Forest Landscape Restoration Program in 2009.⁷² The program provides \$40 million in funding per fiscal year to pay up to 50% of collaborative projects designed to promote forest restoration on a landscape level.⁷³ Crucially, the program adopts an approach in which public and private landowners develop and implement projects through collaborative processes.⁷⁴

2. Common Law

Roman law and English common law doctrines influenced colonial-era land policies, including the public-trust doctrine, although European land ownership patterns were vastly different than the undeveloped American landscape.⁷⁵ The British Crown granted land to companies, which the colonies then assumed around the time of the Revolution.⁷⁶ Later, western lands were ceded to the federal government.⁷⁷ Roman and English law also

65. Alaska National Interest Lands Conservation Act, 16 U.S.C. §§ 3101–3233 (2012); GEORGE J. BUSENBERG, OIL AND WILDERNESS IN ALASKA: NATURAL RESOURCES, ENVIRONMENTAL PROTECTION, AND NATIONAL POLICY DYNAMICS 64–67 (2013) (discussing the Alaska National Interest Lands Conservation Act (“ANILCA”).

66. Wilderness Act, 16 U.S.C. §§ 1131–1136.

67. Clean Water Act, 16 U.S.C. § 1273.

68. Coastal Zone Management Act of 1972, 16 U.S.C. §§ 1451–1464.

69. 42 U.S.C. §§ 7401–7671q (2012).

70. 16 U.S.C. § 1251.

71. Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544.

72. Omnibus Public Land Management Act of 2009, Pub. L. No. 111-11, 123 Stat. 991 (codified as amended in several scattered titles of U.S.C.).

73. Martin Nie & Michael Fiebig, *Managing the National Forests Through Place-Based Legislation*, 37 *ECOLOGY L.Q.* 1, 45 (2010).

74. Thomas D. Sisk, Essay, *Seeding Sustainability in the West*, 31 *UTAH ENVTL. L. REV.* 79 (2011). Stakeholders, including environmental groups and members of the timber industry, are generally supportive of the program. The program formalizes various efforts throughout the West. Nie & Fiebig, *supra* note 73, at 45 (“The program has received broad-based support, from both environmental groups and the forest products industry.”).

75. Nie & Fiebig, *supra* note 73, at 45.

76. *Id.*

77. COGGINS & GLICKSMAN, *supra* note 48, § 3:2.

influenced numerous common law doctrines governing landscape-level resources.⁷⁸

Common law developed by American courts—the Constitution does not explicitly grant authority to courts over land, but courts are nonetheless important in interpreting agency action under various statutory provisions—plays a vital role in management of land and resources. Litigation to resolve natural resource disputes have developed legal doctrines, as with the “rule of capture” in oil and gas law. Hard rock mining and environmental statutes are essentially codifications of judge-made common law.⁷⁹ Principles from other discrete areas of law—such as contract law governing agreements made between parties or tort law allocating liability—play sizeable roles in controlling landscapes.

3. Executive and Agency Control

Since colonial times, the sovereign has exercised control over many natural resources at his discretion.⁸⁰ Today, administrative agencies located within the executive branch—such as the Bureau of Land Management and United States Forest Service—administer laws enacted by Congress. For example, when Congress designates a national park, the National Park Service, a federal administrative agency, oversees the park. Agencies promulgate regulations that translate statutes into policy. Within the confines of statutory language, agencies have considerable discretion to develop policies with sweeping influence on land management.

Agencies are incorporating public–private approaches towards landscape management. For example, in 2009, the Bureau of Land Management established the National Landscape Conservation System (“System”) “to conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations.”⁸¹ The System includes national monuments, national conservation areas, wilderness study areas, national scenic trails, components of National Wild and Scenic Rivers Systems, and components of

78. Richard Epstein has traced the evolution of tort law for wildfire liability from Roman to early English times. Richard A. Epstein, *Common Law Liability for Fire: A Conceptual, Historical, and Economic Analysis*, in WILDFIRE POLICY: LAW AND ECONOMICS PERSPECTIVES 3 (Karen M. Bradshaw & Dean Lueck eds., 2012); see also Thomas W. Merrill, *Property and Fire*, in WILDFIRE POLICY: LAW AND ECONOMICS PERSPECTIVES, *supra*, at 32.

79. COGGINS & GLICKSMAN, *supra* note 48, § 1:27 (“Some niches of natural resources law, such as hardrock mining or environmental assessment, are now basically judge-made common law, even though initially they were premised on a federal statute.” (footnotes omitted)).

80. For example, trees that were “not on lands previously granted to private persons,” and that had a diameter exceeding or equal to 24 inches were reserved as property of Crown for use as ship masts, vital to defense efforts. ERIC RUTKOW, AMERICAN CANOPY: TREES, FORESTS, AND THE MAKING OF A NATION 25–26 (2012).

81. Omnibus Public Land Management Act of 2009 § 2002(a), Pub. L. No. 111-11, 123 Stat. 991.

the National Wilderness Preservation System, along with areas designated by Congress to be administered for conservation purposes.⁸²

In 2009, the Secretary of the Interior issued an order launching Landscape Conservation Cooperatives to form regional networks⁸³ to coordinate management responses to climate change on a landscape-level basis.⁸⁴ The Secretarial Order noted:

Because of the unprecedented scope of affected landscapes, Interior bureaus and agencies must work together, and with other federal, state, tribal and local governments, and private landowner partners, to develop landscape-level strategies for understanding and responding to climate change impacts.⁸⁵

Landscape Conservation Cooperatives are designed to serve as organizing bodies for resource managers and scientists representing a broad array of public and private entities within a particular landscape region.⁸⁶

III. EXAMPLES OF LANDSCAPE-LEVEL RESOURCES

This Part overviews various landscape-level resource types, including: wildlife and marine fisheries, underground landscapes (oil and gas, and groundwater), and fixed landscapes including scenic and recreational landscapes.

A. BIOLOGICAL LANDSCAPES: WILDLIFE AND MARINE FISHERIES

For wildlife resources, the landscape is the territorial or habitat requirement of an animal population, or potentially a group of populations.⁸⁷ For hunter-gatherer societies, only a landscape's wildlife asset was valuable, so that ownership was defined over the landscape. Bison hunting cultures are a prime example.⁸⁸ In the historical development of the United States, however, ownership has been primarily over small-scale assets, thus initially

82. *Id.* § 2002(b).

83. KEN SALAZAR, U.S. SEC'Y OF THE INTERIOR, SECRETARIAL ORDER NO. 3289, ADDRESSING THE IMPACTS OF CLIMATE CHANGE ON AMERICA'S WATER, LAND, AND OTHER NATURAL AND CULTURAL RESOURCES § 3(c) (2009).

84. *Id.* ("Given the broad impacts of climate change, management responses to such impacts must be coordinated on a landscape-level basis.").

85. *Id.*

86. *See generally* BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, THE NATIONAL LANDSCAPE CONSERVATION SYSTEM 15-YEAR STRATEGY 2010-2025: AN OVERVIEW (2011), available at http://www.blm.gov/style/medialib/blm/wo/Law_Enforcement/nlcs/strategies.Par.68641.File.dat/NLCS_Strategy_overview.pdf; *About the LCC Network*, LANDSCAPE CONSERVATION COOPS., <http://lccnetwork.org/About> (last visited Apr. 22, 2015) ("Each LCC brings together federal, state, and local governments along with Tribes and First Nations, non-governmental organizations, universities, and interested public and private organizations.").

87. *See generally* Dean Lueck, *The Extinction and Conservation of the American Bison*, 31 J. LEGAL STUD. 5609 (2002).

88. *Id.* at S618-19.

resulting in open access for many populations. The primary development has been for states to assume primary control over the wildlife landscape, with the exception of endangered species, which are subject to federal control.

In cases where wildlife extends beyond state borders, there have been compacts and other interstate agreements. The fullest example of this is the creation of flyway councils for migratory waterfowl.⁸⁹ For populations whose territory extends beyond state borders, the councils create governance regimes that operate at a landscape level rather than according to arbitrary state boundaries. When the state of Missouri challenged the federal government's authority to regulate migratory birds, Justice Holmes found:

To put the claim of the State upon title is to lean upon a slender reed. Wild birds are not in the possession of anyone; and possession is the beginning of ownership. The whole foundation of the State's rights is the presence within their jurisdiction of birds that yesterday had not arrived, tomorrow may be in another State and in a week a thousand miles away.⁹⁰

In other settings, private control has emerged over the wildlife landscape. This is most notable in Great Britain (and continental Europe) and in South Africa. In Great Britain, the law developed to put most control in the hands of private landowners. This regime reflects a situation where the habitat requirements for most wildlife are small compared to the private holders' requirements for non-wildlife assets.⁹¹ The pathway to private wildlife control is different in South Africa, where large populations were decimated in the 19th and 20th centuries and the government granted ownership of wild animals to private parties. This led to large-scale contracting for landscape control and the reestablishment of wild populations.⁹² The only comparable result in the United States is for bison, which are treated as domestic animals so that landowners can gain from contracting for large bison landscapes. A number of public-private contracting approaches to wildlife management have emerged, as with Candidate Conservation Plans under the Endangered Species Act.⁹³

The landscape for marine fisheries is similar to wildlife in that the territorial expanse tends to be at a large scale.⁹⁴ The difference is that there generally is not a related small-scale asset over which private parties have

89. See generally Migratory Bird Treaty Act, 16 U.S.C. §§ 703–712 (2012 & Supp. I 2013).

90. *Missouri v. Holland*, 252 U.S. 416, 434 (1920).

91. Dean Lueck, *The Economic Nature of Wildfire Law*, 18 J. LEGAL STUD. 291, 300–03 (1989).

92. Jenny A. Cousins et al., *The Challenge of Regulating Private Wildlife Ranches for Conservation in South Africa*, 15 ECOLOGY & SOC'Y 28 (2010).

93. We are indebted to Robert Fischman for this point. For a discussion of candidate conservation plans, see generally Vicky J. Meretsky & Robert L. Fischman, *Learning from Conservation Planning for the U.S. National Wildlife Refuges*, 28 CONSERVATION BIOLOGY 1415 (2014).

94. See generally TERRY L. ANDERSON & GARY D. LIBECAP, ENVIRONMENTAL MARKETS: A PROPERTY RIGHTS APPROACH 73–86 (2014).

control. In general, large landscape claims on marine assets were not enforceable. Open access exploitation became the rule. In many cases during the 20th century, common property regimes emerged to effectively control the fisheries landscape. The most famous of these are the so-called lobster gangs of Maine.⁹⁵ Lobster gangs acted under a series of norms governing behavior not contemplated by the law.⁹⁶

Law has influenced private contracting in the marine landscape in several ways. The establishment of the 200 nautical mile United States Exclusive Economic Zone was a first step in limiting open access.⁹⁷ Antitrust law seems to have had the effect of limiting private contracting for many inshore fisheries throughout the United States.⁹⁸ Antitrust law has enjoined the exclusive practices of fishing groups since the 1930s. But, because these groups often limited open access exploitation, they were thus likely serving a conservation purpose.

B. UNDERGROUND LANDSCAPES: OIL–GAS AND GROUNDWATER

Large-scale underground assets, such as hydrocarbon reserves and groundwater aquifers, provide another example of landscape-level resources. In the 19th century, both resources were often subject to open access over exploitation because the common law doctrine of *ad coelum* was coupled with relatively small-scale landowners. Under the *ad coelum* doctrine, surface owners have the right to exploit underground resources regardless of the underground connectivity of those resources.⁹⁹

In the case of oil and gas, this led to the “rule of capture” doctrine, which emerged in all oil–gas states.¹⁰⁰ This quote from a Pennsylvania judge is typical:

[E]very landowner or his lessee may locate his wells wherever he pleases, regardless of the interests of others . . . What then can the neighbor do? Nothing; only go and do likewise. He must protect his

95. See, e.g., JAMES M. ACHESON, *THE LOBSTER GANGS OF MAINE* (1988).

96. *Id.* at 48–70 (“The [lobster fishing] industry has rules that all men are expected to obey, its own standards of conduct, and its own mythology.”).

97. The Exclusive Economic Zone (“EEZ”) extends out to 200 nautical miles seaward from the American coastline, which is equivalent to 230 land or statute miles, except where truncated by international maritime boundaries. BUSENBERG, *supra* note 65, at 120–22 (discussing how EEZ was established, the divided system of federal and state maritime jurisdictions, and the units of measurement used at sea).

98. Jonathan H. Adler, *Conservation Through Collusion: Antitrust as an Obstacle to Marine Resource Conservation*, 61 WASH. & LEE L. REV. 3, 3–8 (2004).

99. The full Latin phrase is *cujus est solum ejus est usque ad coelum* meaning “to whomsoever the soil belongs, he also owns to the sky and to the depths.” *United States v. Causby*, 328 U.S. 256, 260–67 (1946) (illustrating an attempt to achieve compensation for taking from military airplanes flying overhead at low levels).

100. 1 BRUCE M. KRAMER & PATRICK H. MARTIN, *THE LAW OF POOLING AND UNITIZATION* § 2.01 (3d ed. 2013).

own oil and gas. He knows it is wild and will run away if it finds an opening and it is his business to keep it at home. This may not be the best rule; but neither the Legislature nor our highest court has given us any better.¹⁰¹

Well documented is the waste from over-drilling and related inefficiencies during the oil industry's first half-century, as are the contracts that controlled underground reservoirs through the process known as unitization.¹⁰² Contracting regimes often failed to incorporate large numbers of heterogeneous landowners. In response to this difficulty, states enacted compulsory unitization statutes, which forced non-signing parties into a unit using super-majority rules.¹⁰³ This legal innovation modified private contracting regimes to facilitate large landscape contracting.

In groundwater, the *ad coelum* doctrine led to a variety of outcomes. In some states, the doctrine of absolute ownership emerged. An illustration typical of the doctrine is *Huber v. Merkel*, a 1903 Wisconsin case that held a landowner has an absolute right to use the groundwater located under his land for any purpose, including malicious waste.¹⁰⁴ In this well-interference case, the courts affirmed the rule of capture (with reference to percolating water), holding that:

[T]he appellant had a clear right at common law, resulting from his ownership of land, to sink a well thereon, and use the water therefrom as he chose, or allow it to flow away, regardless of the effect of such use upon his neighbors' wells, and that such right is not affected by malicious intent.¹⁰⁵

Many doctrines and laws govern modern groundwater law across the states, including Texas's minority approach limit of malicious use. Despite many commentators' agreement that a landowner's ownership of water *in situ* is an illogical rule, Texas notably retains this doctrine, which was affirmed as recently as 2012.¹⁰⁶ Most states, however, rely on a reasonable use approach, with minority approaches including correlative rights and conjunctive management systems, in which rights are prioritized according to prior approaches. The success of private contracting under the absolute ownership

101. *Barnard v. Monongahela Natural Gas Co.*, 65 A. 801, 802 (Pa. 1907).

102. Gary D. Libecap & Steven N. Wiggins, *Contractual Responses to the Common Pool: Protating of Crude Oil Production*, 74 AM. ECON. REV. 87 (1984).

103. An example of this is the force pull regime in New Mexico. See 1 KRAMER & MARTIN, *supra* note 100, at 18-1 to 18-27 (discussing various states; compulsory unitization statutes).

104. See generally *Huber v. Merkel*, 94 N.W. 354 (Wis. 1903) (holding a law unconstitutional where it made a land owner who needlessly used water from his own artesian well liable for damages to others with nearby artesian wells), *overruled by* *State v. Michels Pipeline Constr. Inc.*, 217 N.W.2d 339 (Wis. 1974).

105. *Id.* at 357.

106. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 831-32 (Tex. 2012).

doctrine is not well studied as compared to the same issue in oil-gas (unitization).¹⁰⁷

C. *THE SCENIC AND RECREATIONAL LANDSCAPE*

The value of large scenic and geological landscapes—such as the Yellowstone Basin, the Grand Canyon, or Mount Rainier—suggest that ownership of the scenic asset should be defined in terms of the largest scale asset, or the landscape itself. In the United States, the dominant organizational form for such landscapes is federal ownership and control through the National Park System. Scenic landscapes are characterized by their public good output compared to resources discussed thus far. The laws governing federal land disposal in the 19th century made it extremely costly for private parties to capture the value of these large landscapes.¹⁰⁸ We discuss two examples—the Grand Canyon and Yellowstone—that illustrate this point and suggest how alternative laws might have generated a different landscape-level resource-governance regime.

As noted above,¹⁰⁹ 19th century land disposition laws tended to limit the size and uses for private claims to 640 acres or less, and to agricultural or extractive uses.¹¹⁰ There simply was no legal mechanism to make private claims to large-scale scenic and recreational assets. Private parties, seeing the potential wealth and rents to be earned from scenic assets, attempted to create private landscape-level viewsheds. For example, railroads attempted to create a privatized Yellowstone Park with transportation and hotel monopoly to generate revenue.¹¹¹ Private contracting was not possible, so the private entrepreneurs used the political system to create a national park.

A private party similarly tried to privatize the Grand Canyon to profit from its scenic properties. In *Cameron v. United States*, the Court ruled in favor of the United States, which sought to enjoin Ralph Cameron from using a mining tract within the Grand Canyon National Monument (a designation

107. Economically, the well interference cases are the same for both assets and the rule of capture doctrine has the same economic incentives for overuse in water as it does in oil. See JAMES R. RASBAND ET AL., *NATURAL RESOURCES LAW AND POLICY* 779, 785 (2004) (discussing the rule of capture in groundwater law). For a discussion of private and quasi-private groundwater management, see generally WILLIAM BLOMQUIST, *DIVIDING THE WATERS: GOVERNING GROUNDWATER IN SOUTHERN CALIFORNIA* (1992).

108. See generally Terry L. Anderson & Peter J. Hill, *Appropriable Rents from Yellowstone Park: A Case of Incomplete Contracting*, 34 *ECON. INQUIRY* 506 (1996) (discussing the Northern Pacific Railroad's attempt and failure to capture the value of Yellowstone Park).

109. See *supra* Part II.C.1.

110. RASBAND ET AL., *supra* note 107.

111. See Anderson & Hill, *supra* note 108, at 510–13 (detailing the lobbying efforts of the Northern Pacific Railroad to get the park established, to establish a railhead there, and to develop hotels).

later to become a national park) and to remove Cameron's buildings.¹¹² Cameron used the Mining Law of 1872 to claim land on the Canyon rim and developed a trail to the bottom that tourists could use for a fee.¹¹³ Cameron had a livery stable and charged trail access fees for many years.¹¹⁴ He used mineral laws to garner private gain from the land.¹¹⁵ Cameron's action can be interpreted as an attempt to create control of the canyon landscape in the presence of law that clearly did not account for landscape-level privatization for scenic and recreational purposes.

* * *

The preceding discussion briefly overviews contracting's role in governing a variety of landscape-level resources. Below, we look more closely at wildfire, a subset of landscape-level resources, in which contract plays a role in management and use decisions.

IV. CONTRACTING TO MANAGE THE WILDFIRE LANDSCAPE

Several factors make wildfire a compelling example for more detailed case studies about the role of contract in landscape-level resources.¹¹⁶ As with most landscape-level resources, the wildfire resource exceeds the size of individually sized land parcels.¹¹⁷ Wildfire can extend across public and private parcels, with complementary or competing land uses. Firescapes are ephemeral and uncertain in nature; their outbreak and spread cannot be determined *ex ante*.¹¹⁸ Managing firescapes is temporally divided between

112. See *Cameron v. United States*, 252 U.S. 450, 454–55, 464–65 (1920) (denying use of mining rights to preserve a recreational use); see also RASBAND ET AL., *supra* note 107, at 595–960 (discussing how Cameron went on to become a United States Senator from Arizona).

113. See *Cameron*, 252 U.S. at 454–57 (discussing Cameron's attempt to claim the land that included a path into the canyon as a mining tract).

114. See *id.* at 458 (stating that Cameron used the land “for livery and other business purposes”).

115. See *id.* at 463 (discussing Cameron's attempted use of mining laws).

116. Wildfire is a largely under-explored area of law. Karen M. Bradshaw, *A Modern Overview of Wildfire Law*, 21 *FORDHAM ENVTL. L. REV.* 445, 445–46 (2010) (discussing the relative lack of scholarly attention to the large and growing legal issues presented by wildfire). For the linkage between economics and law in wildfire management, see generally *WILDFIRE POLICY: LAW AND ECONOMICS PERSPECTIVES*, *supra* note 78.

117. Karen M. Bradshaw, *Backfired! Distorted Incentives in Wildfire Suppression Techniques*, 31 *UTAH ENVTL. L. REV.* 155, 160–62 (2011) (illustrating through the use of a diagram the uncertain spread of wildfire over a landscape, and the mix of land parcels that may be included in a single fire event).

118. Dean Lueck & Jonathan Yoder, *The Economic Foundations of Firefighting Organization and Institutions*, 113 *J. FORESTRY* 291 (2015) (examining the economic incentives that underpin the structure of wildfire suppression organizations).

preventative,¹¹⁹ suppressive,¹²⁰ and restorative¹²¹ activities. As with the management of other resources, wildfire management is a controversial subject, with vigorous debate about the proper approaches to suppression. For these reasons, wildfire provides a useful example for further exploration of the factors leading to contractual regimes for resource management.

A. OVERVIEW OF THE CASE STUDIES

Based upon a body of previous research on wildfire, we hypothesize the following: conflicting property uses reduce the potential for neighbors to bargain to control private landscape-level assets.¹²² We seek to explore the various contracting examples along the dimensions of landowner heterogeneity, transaction costs, relevant laws and levels of enforcement. We predict that when landowner incentives align and parties regularly transact with one another on a variety of matters, they can readily bargain to reach mutually beneficial wildfire prevention and suppression agreements.¹²³ As landowners become more heterogeneous and the transaction costs associated with bargaining grow, we anticipate that contract will play a less important role in the management of wildfire. Accordingly, government control of the wildfire resource is likely to have a direct relationship to increasing heterogeneity and transaction costs.

A countervailing consideration is land management agencies' increased focus on public-private partnerships, in which the government cooperates with stakeholders including extractive land users and nongovernmental organizations.¹²⁴ Given the mix of public and private landholding patterns, public-private partnerships are particularly well suited to *ex ante* wildfire risk reduction. Parties bargain with one another to agree to risk-reduction strategies, such as forest thinning and road construction.¹²⁵ These negotiations take the form of public-private governance bodies that operate

119. Preventative activities are those designed to reduce the risk of catastrophic wildfire, and include activities such as: building roads and helipads to provide access to remote areas in case of fire, thinning trees to reduce forest density, and creating fire patrols to promote early detection of fire starts (which, in turn, leads to earlier suppression).

120. Suppressive activities refer to those actions taken to control or extinguish wildfire after fire begins, and include water drops onto wildfire, developing fire lines or firebreaks, and backfire.

121. Restorative activities are designed to repair perceived damage caused by wildfire, such as preventing erosion or replanting trees. These activities begin after the wildfire is extinguished.

122. See *supra* Part II.B.

123. Karen M. Bradshaw, *Norms of Fire Suppression Among Public and Private Landowners, in WILDFIRE POLICY: LAW AND ECONOMICS PERSPECTIVES*, *supra* note 78, at 89, 106-07.

124. Bradshaw Schulz, *supra* note 5, at 2518-19.

125. For a discussion of bargaining in public-private governance arrangements, see Abbott & Snidal, *supra* note 1, at 70-83.

under contractual agreements¹²⁶ to share responsibility for risk reduction efforts. The success of such partnerships in producing meaningful contractual control over wildfire extends beyond this context to broader questions about the conditions under which public–private partnerships can—and should—displace government action.

Below, we explore the various contractual regimes that have emerged to govern firescapes along the dimensions discussed above. We begin with the most basic example: contracts to control a firescape as formed between two or more private parties with pre-existing relationships, or repeat transacting to control a firescape. We continue with examples of increasing complexity along the dimensions of increased homogeneity levels among landowners and resource uses, which tend to correlate with increased transaction costs. In response to these changed conditions, more complex contractual regimes emerge, as with outsourcing resource control to third parties, including insurers and public–private stakeholder groups. Government also acts as a party to contracts, as with state fire protective associations, federal land managers, and federal farm agencies that act to protect farm interests from wildfire risks.

Organizationally, we break the different contractual regimes into three rough categories divided by primary land uses: (1) timberlands; (2) wildland urban interface areas (a mix of timberland and homes); and (3) grazing. These divisions are somewhat arbitrary—one can easily imagine categorization along another dimension, such as a degree of landowner heterogeneity, or role of government agency—but allow for some degree of comparison across case studies, in addition to the larger themes of landowner heterogeneity, transaction costs, relevant laws and levels of enforcement, and the role of contract.

The figure below provides a summary of the discussion within the individual case studies.

126. Contracts can take the form of Memorandum of Understanding between government agencies and stakeholder groups. *See, e.g.*, U.S. DEP'T AGRIC. FOREST SERV., OMB BULL NO. 0596-0217, MEMORANDUM OF UNDERSTANDING BETWEEN THE 4 FOREST RESTORATION INITIATIVE (4FRI) COLLABORATIVE STAKEHOLDER GROUP REPRESENTATIVES AND THE U.S. FOREST SERVICE APACHE-SITGREAVES, COCONINO, KAIBAB AND TONTO NATIONAL FORESTS (2011), *available at* http://www.4fri.org/pdfs/MOU_with_signatures.pdf.

Figure 2. Contractual Regimes to Manage the Wildfire Resource

Setting	Landowner Types	Valued Natural Resources	Degree of Landowner Heterogeneity	Transaction Costs of Contract Formation	Relevant Laws & Enforcement Levels	Role of Contract
1.A. Pacific Northwest: Commercial Timberland	Commercial timber landowners, US Forest Service	Timber	Very low	Very low. Repeat transactors on many issues; vibrant trade groups; shared social norms.	Laws exist but are rarely enforced; social norms prevail to resolve disputes.	Informal contracts commonly used with the express goal of displacing government action.
1.B. Pacific Northwest: Mix of Public and Private Forests	Commercial timber landowners, US Forest Service, National Parks, Bureau of Land Management, State Land Management Agencies	Timber, wildlife, recreation, conservation/preservation, scenic	Low	Mixed. Dependent upon agency type and trust among parties. Transaction costs generally perceived as lower with state agencies.	Agency authority divided between landowner and firefighting capacity.	High levels of informal coordination. Agencies can exert unilateral control if private bargaining fails.
2.A. Commercial Timberland and Wildland Urban Interface Areas	Commercial timber landowners, private homeowners	Timber, wildlife, recreation, conservation/preservation, scenic	Medium	High. Distrust between parties and conflicting approaches to resource management generally.	Default local, state, and federal regulation of fire suppression activities. Examples of agency capture to maximize the goals of particular landowner types.	Landowners may contract with private suppression agencies when agency action prioritizes homeowner needs above commercial timber values.
2.B. Arizona Four Forests Restoration Initiative ("4FRI")	US Forest Service, private homeowners, small communities, commercial timber producers, environmental NGOs	Timber, wildlife, recreation, conservation/preservation, scenic, water	High	High initially; lower over time. Distrust between parties and conflicting approaches to resource management generally.	US Forest Service control sub-delegated to stakeholder group.	Heavy reliance on contract to manage sub-delegate authority and control stakeholder interactions.
3. Southern California Homes in Fire-Prone Areas	Private homeowners	Wildlife, recreation, conservation/preservation, scenic	Low	Medium. Shared goals but not repeat transactors and little alignment of commercial goals.	Default local, state, and federal regulation of fire suppression activities. Private (insurer) regulation for preventative and some suppressive activities.	Frequent contracting between homeowners and insurers. Virtually no public-private contracting or contracting between neighbors.
4.A. Texas Cattle Ranchers	Ranchers/grazers, US Department of Agriculture	Grazing	Low	Low. Repeat transactors on many issues, shared social norms.	Heavily regulated by government agencies. Little private protective or suppressive action.	Virtually no private contracting because government acts as both insurer and firefighter.
4.B. Malpai Border Land	Public land management agencies, cattle ranchers	Grazing	Low	Low. Repeat transactors on many issues, shared social norms.	Shared social norms of grazeland as a priority dominates background laws.	Contracting used for land sales but less so for the use of fire to manage

B. COMMERCIAL TIMBERLANDS—PUBLIC AND PRIVATE

We explore two contracting examples from the commercial timberland context to explore the role of landowner heterogeneity and transaction costs in the existence of contract-based wildfire management regimes. First, we look at the most straightforward case: contracting among adjacent private timberland owners who have well-aligned goals for resource use and low transaction costs. Second, we discuss contracting between adjacent private and public timberland owners, the goal alignment of which has shifted over time.

1. Contracting Between Private Commercial Timberland Owners

In forested areas, institutional landowners are property owners with 5000 or more forested acres, which are typically commercially harvested. Landowners at this scale typically have the resources to bear fire-related losses, and describe themselves as “self-insured” (they do not carry wildfire insurance policies).¹²⁷ Commercial timberland owners are well positioned to undertake *ex ante* fire prevention measures, such as thinning or road construction, which are conducive with regular forest management practices. Commercial timberland owners also perform individual patrol and monitoring activities, often to the benefit of neighboring and nearby landowners who provide reciprocal services.

Adjacent commercial timberland owners are homogenous landowners with shared land use goals. They regularly bargain and contract for a variety of land management activities, such as reciprocal road use agreements. Strong, preexisting relationships facilitated by the adjacent nature of landholdings and the small forest industry group make the costs of transacting quite low.¹²⁸ With regard to wildfire management specifically, timberland owners have historically coordinated through private protection agencies to provide property and suppression activities.¹²⁹ This provided landscape-level wildfire management via contract. The benefits to private protection agencies included enhanced control over wildfire strategy relative to government firefighting action. More recently, landowners will hire private, for-profit

127. Sovereign immunity prevents commercial timberland owners from receiving compensation for wildfire damage to timber caused by fire suppression decisions. In the vast majority of cases in the wildland context, commercial timberland owners receive only tax write-offs for the value of lost timber. Only under the extremely rare circumstance of government agents starting an unintentional wildfire that spreads to private land due to negligence in their land manager capacity will commercial landowners receive direct government compensation for chattel lost as a result.

128. Bradshaw, *supra* note 117, at 451–52 (indicating that cooperation among stakeholders in wildfire suppression can help reduce cost).

129. See generally Lueck & Yoder, *supra* note 118 (examining the economic incentives that underpin the structure of wildfire suppression organizations).

firefighting services to protect timber stands and related assets when government firefighting services are unable, or unwilling, to do so.¹³⁰

2. Contracting Between Private and Public Commercial Timberland Owners

Commercial timberland owners bordering government land management agencies, such as the United States Forest Service, provide an example of an interesting variation in the homogeneity of landowners.¹³¹ Historically, the goals of these public and private timberland owners were almost indistinguishable—both sought to maximize profit from commercial timber harvesting. During the eras of aligned land use preferences, public and private forest owners bargained to govern landscape-level resources, including firescapes, through contractual agreements of varying formality.¹³² A shared desire to maximize commercial timber values facilitated the formation of contracts because maximizing commercial timber values relies upon aggressive fire protection.

Over time, the land use and management goals of public and private forest owners diverged. Public land management agencies shifted land use goals away from a sole focus on profit-maximization through timber harvest. As the divergence between land use goals grew, so too did the homogeneity of land managers. Private commercial timberlands continue to be managed by foresters with similar educational backgrounds and repeat transactions. Public timberlands increasingly became controlled by managers with an array of scientific backgrounds, instead of the forester-dominated agencies of the past. The influx of non-foresters into land management roles reduced the likelihood of private bargaining resulting between private landowners and federal land management agencies.

In the absence of bargaining to garner synergistic wildfire managements, government land management entities and landowners lost trust in one another. Informal coordination on preventative, suppressive, and restorative activities lessened. Agencies increasingly exerted unilateral control over resource management. Private commercial timberland owners relied less upon public resource availability and support for their wildfire suppression priorities and began the once unheard-of practice of hiring private firefighting teams.

The reprioritization of National Forests from commercially productive woodlands to areas valued for multi-use values—including recreation, preservation, and conservation—demonstrates that increased homogeneity of

130. For a discussion of the timeline of wildfire suppression practices, particularly with regard to the progression of the relationship between public and private land managers, see Bradshaw Schulz, *supra* note 5, at 2531–39 (describing the various eras of public–private partnerships between commercial timberland owners and land management agencies).

131. See generally Bradshaw, *supra* note 123.

132. *Id.*

land managers and desired uses can diminish the attractiveness of private bargaining and contract as a land management strategy. When federal land management agencies prioritized away from commercial timber production, their willingness, and indeed need, to negotiate with timber landowners lessened with regard to many resource decisions.¹³³ As agencies began to value the reintroduction of wildfire to the natural landscape, conflicts with landowners about fire prevention and suppression strategies sharply increased.

C. WILDLAND URBAN INTERFACE AREAS

This Subpart considers two case studies, which illustrate the effects of heterogeneity of parties and high transaction costs in coordinating wildfire management. Both examples rely upon third parties to manage wildfire. First, we consider Southern California homeowners, who pay insurers to consolidate information, innovate in protection strategies, and protect against wildfire risk. Second, we consider the mix of landowners in Arizona—including Federal agencies, environmental nongovernmental organizations, small communities, timberland owners, and individual landowners—who work collaboratively to manage *ex ante* wildfire risk, under a collaborative regime facilitated by the Forest Service.

1. Southern California Homeowners

Land ownership fragmentation did not end with land disposition programs of the 19th century. Population growth and urban sprawl have converted many former timberlands into subdivisions in areas known as “wildland urban interface areas.”¹³⁴ Wildland urban interface areas necessarily present issues of homogeneity in landowner type and land uses, as they involve the sprawl of houses into historically wild areas. Thus, adjacent parcels include land use conflicts. Further, given the relative newness of the sprawl, adjacent landowners lack preexisting relationships and hence the possibility of repeat contracting over time, increasing the transaction costs of bargaining directly with neighbors. As a result, one sees landowners with shared objectives and uses—as with adjacent homeowners—contracting through third parties to manage wildfire risk.

This dynamic is evident with high-value homes owned by high net worth individuals in Southern California, where homes are increasingly built in historically wild areas due to high demand for housing and high housing prices. Homeowners seeking individual use and enjoyment of residential property have little homogeneity with existing users of industrial-size tracts of land on which subdivisions are built. The transaction costs between residential land users and commercial land users are high because of the relative newness

133. *Id.*

134. Bradshaw, *supra* note 117, at 456.

of residential uses and a mismatch, which obviates the possibility of a history of repeated transactions over time and the attendant benefits of trust, shared systems of non-judicial dispute resolution, and the willingness to enter into informal contracts with vague terms. Moreover, potentially conflicting land use goals reduce the potential for bargaining. As between individual homeowners, the heterogeneity in land uses is low—both parties seek residential uses that are likely complementary—but the costs of transacting are high and only grow across multiple users. Despite high heterogeneity among landowners and high transaction costs providing a bar to bargaining, the desire for any individual to protect against wildfire risk and engage in *ex ante* management of the wildfire resource is high.

Individual landowners internalize the cost of wildfire risk, albeit only under the unlikely circumstance that they do not carry fire insurance. Sovereign immunity protects government firefighters from compensating homeowners for wildfire loss, even if the loss is the result of government decision-making. Courts have consistently held that homeowners may not recover compensation for property damage from firefighters. This bar against liability has created a robust market for home insurance policies that include protection against wildfire losses.¹³⁵ Lenders require homeowners to carry fire insurance on homes with mortgages, although homeowners may choose among insurers. Home insurance among homeowners in wildland urban interface areas is ubiquitous. Standard homeowner insurance provides private compensation for losses caused by fire.¹³⁶

Third-party private regulation provides an alternative to government or landowner control of the wildfire resource. This regulation preserves the benefit of centralized administration while offering the flexibility of choice among competing regulators. Consistent with recent literature about insurers-as-regulators,¹³⁷ insurers influence homeowner behavior in urban interface areas. Insurers prompt landowners to invest *ex ante* in safety measures by pricing policies lower for fire-safe measures (such as fire-resistant roofing) and educating homeowners about creating fire safe perimeters.¹³⁸ Insurers are well suited to affect homeowner behavior regarding fire risks because they can pass the risk reduction benefits along to homeowners in the form of reduced policy premiums. Insurers are also a centralized, trusted form of

135. H.R. Moch Co. v. Rensselaer Water Co., 247 N.Y. 160, 164 (1928).

136. Fred S. McChesney, *Smoke and Errors*, LIBR. ECON. & LIBERTY (June 24, 2002), <http://www.econlib.org/library/Columns/Mchesneyfire.html> (noting the difficulties of holdouts in a firehosed and how in urban areas private insurance was replaced by municipal fire departments).

137. See, e.g., Ben-Shahar & Logue, *supra* note 43.

138. See, e.g., FIREMAN'S FUND INS. CO., PROTECTING YOUR HOME FROM WILDFIRE: PROACTIVE PREPARATION CAN SPARE YOUR HOME FROM DESTRUCTION 3 (2012), available at https://www.firemansfund.com/v_1403707838000/home/documents/non-validated/20056-protecting-home-from-wildfire.pdf (noting that the insurer “offers region-specific wildfire retrofit guides, a Wildfire Home Assessment & Checklist, and wildfire preparedness brochures focusing on commercial, residential, and farms and ranches”).

information for homeowners. They proactively produce and provide information to homeowners, reducing search costs for consumers seeking data about fire safety.

In addition to *ex ante* risk reduction, insurers also provide private suppression efforts when fire approaches insured property. In New Jersey, insurers give high-value homeowners in high-risk areas canisters of foam to spray on the house in the event of a fire in the area.¹³⁹ In Southern California, insurers fund foam-spraying crews to protect insured homes within at-risk subdivisions. Insurers' investments in home-protection technologies have spurred innovation in such technologies that individual homeowners would not undertake. Because government land management agencies do not bear the cost of burned homes, they lack the incentive to invest in home-protection technologies.

By entering into protection contracts with third-party insurers, homeowners are able to garner the benefits of shared management of wildfire risk. Any individual landowner would strain to afford the costs of producing information about *ex ante* risk reduction practices or the cost of innovating new fire protection products. Further, such investments at the individual level would be ill placed, because of the uncertain nature of whether a wildfire will burn any individual property. By outsourcing aspects of wildfire management to insurers, however, cost spreading occurs. Individual homeowners are able to pool resources to provide efficient production of information and innovation in wildfire fighting technologies. Thus, bargaining with a third party who pools similarly situated landowners at once privileges the homogeneity of land users while reducing the otherwise impossible transaction costs likely to occur through direct, person-to-person bargaining.¹⁴⁰

2. The Four Forests Restoration Initiative

Neighboring property owners—government land management agencies, forestry companies, and homeowners—may have sharply divergent views of ideal land use and management. As land uses have become more diverse, the potential for direct bargaining among parties seemingly decreases as well. Absent homogenous preferences towards wildfire policy, government agents historically displaced private contracting for firescape management.¹⁴¹ Yet, with shifts towards public-private approaches, firefighting agencies are

139. For a discussion of fire-retardant foam spray products with residential applications, see Sam Byker, *Fire Retardants That Protect the Home*, L.A. TIMES (Nov. 25, 2007), <http://www.latimes.com/business/realstate/la-re-fire25nov25-story.html#page=1>.

140. It is important to note that insurers reduce risk against the backdrop of government firefighting during a wildfire. Suppression, unlike *ex ante* prevention, is so expensive that it is generally spread across society instead of particularized groups, like a particular set of homeowners.

141. Merrill, *supra* note 78, at 39 (“Firefighting today is unambiguously state action.”).

experimenting with shifting their role from unilateral control towards more collaborative approaches.

Northern Arizona is comprised of pine forests, which include public lands, private commercial forests, small towns, and wildland urban interface areas. Wildfire risk is high, as evidenced by massive wildfires that have destroyed more than a half million acres in the region within the past five years.¹⁴² The desired land uses of various landowners diverge sharply. Transaction costs in reaching contractual arrangements are high. Yet, the persistent and growing risk of wildfire impacting all landowners has prompted action.

In 2011, the United States Forest Service began a collaborative project to undertake landscape-level wildfire restoration. The Four Forest Restoration Initiative (“4FRI”) was designed to restore wildlife to 2.5 million acres of ponderosa pine forests, including large holdings in the Kaibab and Coconino National Forests. Fire danger in that area is high because of a high density of small trees and a low water table, which gives rise to the risk of large, intense wildfires near wildfire urban interface areas. The United States Forest Service subdelegated authority for forest management¹⁴³ to a group of stakeholders, including “federal agencies, environmentalists, businesses and local governments”¹⁴⁴ organized as 4FRI.¹⁴⁵ To reduce wildfire risk, 4FRI stakeholders negotiated to allow mechanical tree thinning and controlled burns. They sought to develop diverse timberlands resilient to wildfire and capable of sustaining native plants and animals. Progress has been slow and controversial; the final environmental impact statement was only recently released after five years of coordination and is still subject to another round of public comment.¹⁴⁶

142. Breanna Goth, *Still a Burning Issue: Forest Thinning Plan Almost Done*, AZ CENTRAL (Dec. 3, 2014, 6:46 AM), <http://www.azcentral.com/story/news/local/arizona/2014/12/03/still-burning-issue-forest-thinning-plan-almost-done/19818275/> (noting a number of fires, including the deadly Yarnell Hill Fire, which have occurred since 4FRI began).

143. In 1976, Congress passed the National Forest Management Act, which allows the United States Forest Service to enter into cooperative agreements with private parties. *See* 16 U.S.C. § 565a-1 (2012) (“To facilitate the administration of the programs and activities of the Forest Service, the Secretary is authorized to negotiate and enter into cooperative agreements with public or private agencies, organizations, institutions, or persons . . . to perform forestry protection, including fire protection, timber stand improvement, debris removal, and thinning of trees. . . . when he determines that the public interest will be benefited and that there exists a mutual interest other than monetary considerations.”).

144. *See* Goth, *supra* note 142 (noting that various organizations “united under an initiative to protect northern Arizona’s ponderosa-pine forests”).

145. Stakeholders for 4FRI include: educational institutions, environmental nongovernmental organizations, land use organizations, county governments, forestry companies and industry associations, and national forests. *Stakeholders*, FOUR FOREST RESTORATION INITIATIVE, <http://www.4fri.org/stakeholders.html> (last visited Apr. 22, 2015).

146. *See* Claudine LoMonaco, *Lost in the Woods: How the Forest Service Is Botching Its Biggest Restoration Project*, HIGH COUNTRY NEWS (Sept. 1, 2014), <http://www.hcn.org/issues/46.15/lost->

4FRI provides an example of a public–private partnership to control *ex ante* wildfire prevention. The partnership enables fragmented landowners to reduce risk and invest in *ex ante* prevention through a series of negotiated agreements. The structure’s formality and the availability of public resources—such as experienced facilitators’ expertise and the availability of grant funding—provide incentives for heterogeneous landowners with divergent land uses to work collaboratively. This structure provides parties with a forum to negotiate, rather than litigate, to use or block competing approaches to wildfire suppression and management.

Wildfire urban interface areas are so fragmented that bargaining transaction costs and collective action problems outweigh benefits of landscape-level planning. The relative financial position of each homeowner is small compared with the larger financial investment of industrial forest owners. This decreases the value each property owner derives from bargaining. Consequently, coordination among landowners produces limited contractual arrangements for wildfire and protection. As a default, government control emerges to avoid the transaction costs associated with bargaining among a large group of individuals with heterogeneous preferences.¹⁴⁷ If, as with Southern California homeowners, government coordination provides management inconsistent with landowner preferences, landowners can bargain with private third parties—in this case, insurers—to subsidize differentiated management aligned with their preferences.

D. CATTLE RANCHERS

Wildfire often conjures an image of burning trees, but actually occurs in a variety of landscapes ranging from Alaskan tundra to Georgian swamps. Introducing case studies of wildfire from non-forest landscapes provides important variations from our initial example of timber landowners. These case studies provide some insight into the extent to which the variables we identify—heterogeneity of parties, land uses, and transaction costs—influence the extent to which parties contract to control the wildfire resource. We look specifically to ranchers who own grazing land in Texas and Arizona to compare outcomes among parties with complementary land uses and low transaction costs. In the example of Texas, government agencies have almost complete control over wildfire management. There is little evidence of private contracting to manage any aspect of the resource. In contrast, Arizona ranchers have developed a protective association to manage wildfire.

in-the-woods (noting that “4FRI was already behind schedule and in danger of collapse” and characterizing Forest Service leadership as “deeply dysfunctional and ineffective”).

147. Merrill, *supra* note 78, at 43–44 (discussing transaction costs as a reason compelling government control over wildfire suppression).

1. Wildfire and Texas Cattle Ranching

Grassland wildfire has received increasing public attention after 3.5 million acres of Texas land burned in the 2010 fire season, producing agricultural losses estimated at \$5.2 billion dollars.¹⁴⁸ Ranchers, who used the land for grazing cattle, largely owned the affected grasslands. There is, however, a growing mix of residential land uses.¹⁴⁹ Despite some encroachment by residential users, the affected landscape can generally be classified as having a low level of heterogeneity among landowners and a high level of homogeneity in land uses. Further, the transaction costs of bargaining among adjacent landowners are low. As with commercial timberland owners, low transaction costs are generated through the following factors: the fixed nature of land giving rise to repeated transactions over time, the adjacent nature of landowners, and shared cultural and social ties.

Unlike timberland and residential landowners, ranchers do not bear the full cost of wildfire-related losses. Government agencies reimburse cattle ranchers for chattel losses that result from wildfire, including damaged fences¹⁵⁰ and deceased livestock,¹⁵¹ regardless of whether the government was responsible for the fire's initiation.¹⁵² For example, the United States Department of Agriculture operates an Emergency Loan Assistance program, which provides low-interest loans to established farm and ranch operators

148. Dina Fine Maron, *Fighters from 43 States Battle Far-Flung Texas Wildfires*, N.Y. TIMES (Apr. 26, 2011), <http://www.nytimes.com/cwire/2011/04/26/26climatewire-fighters-from-43-states-battle-far-flung-tex-37260.html> (noting that of the 2.2 million acres burned by wildfire in the United States in the first quarter of 2011, "an estimated 1.5 million acres"—68% of the total acreage burned—were in Texas).

149. Grassland institutional landowners are typically farmers and ranchers. In both the timberland and grassland contexts, small residential landholdings are increasingly appearing at the borders of traditional land uses (wildland urban interface areas), creating tensions between commercial and residential landowners. John MacCormack, *Texas Wildfire Leaves Smoldering Community Tensions*, MRT.COM (July 25, 2011), http://www.mrt.com/top_stories/article_5aco4c92-679f-501d-87b5-bc333e724972.html?mode=jqm (noting that differing land uses produce conflict in both grassland and timberland contexts).

150. Wildfire causes severe damage to fences necessary to contain or exclude livestock. In 2011, labor and materials to replace a barbed wire fence in Texas cost approximately \$10,000 a mile (or \$2 a foot). Trish Choate, *Ranchers to Wrangle Fence Funds*, TIMES REC. NEWS, (Sept. 21, 2011, 12:23 AM), <http://timesrecordnews.com/news/columnists/ranchers-to-wrangle-fence-funds>.

151. Livestock losses attributable to wildfire provide an interesting foil to the related subject of timber losses attributable to wildfire. The United States Department of Agriculture indemnification program for livestock reimburses livestock owners up to 75% of the market value of the livestock lost to wildfire. In contrast to the livestock indemnity program, foresters who lose trees in the timberland context do not receive direct compensation for lost timber.

152. The United States Department of Agriculture Farm Service Agency sponsors an Emergency Conservation Program that provides emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland damaged by natural disasters, including wildfire. The Emergency Conservation Program is administered by state and county Farm Service Agencies and provides up to 75% of the cost to remove debris and restore fences. *Emergency Conservation Program*, U.S. DEP'T AGRIC. FARM SERVICE AGENCY, <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=ecp> (last visited Apr. 22, 2015).

who suffer a loss of 30% or greater from wildfire, and are unable to receive credit from commercial lenders.¹⁵³

Because wildfire losses are not fully internalized by ranchers, the incentives to contract to manage wildfire appear to be lower than in other contexts. Similarly, because government agencies bear a substantial portion of the costs ranchers incur from wildfire, government incentives to invest in *ex ante* prevention measures are relatively high. The goals of state firefighting officials closely align with those of institutional landowners, and include the protection of private property related to ranching.¹⁵⁴ As a result, government agencies have assumed almost unilateral control in wildfire suppression. We are not aware of ranchers supplementing public suppression efforts with private augmentation (as with timberland owners hiring private firefighting companies, or homeowners employing insurers that will spray their homes with fire-retardant).

There is some evidence of informal collaboration among government firefighting agencies and ranchers, but these appear to be voluntary and not controlled by contract. Agencies provide ranchers with information about how to respond to wildfires, including the options of “go early” or “stay and defend.”¹⁵⁵ Ranchers are encouraged to share their knowledge of their land with firefighters,¹⁵⁶ aid fire efforts by taking steps to minimize property damage,¹⁵⁷ and loan equipment to government firefighting crews.¹⁵⁸ Ranchers

153. Loans are available for terms of one to twenty years. ASHLEY C. LOVELL & JOE L. OUTLAW, TEX. AGRILIFE EXTENSION SERV. TEX. A&M UNIV., OBTAINING DISASTER ASSISTANCE FOR FARMS AND RANCHES 1 (2005), available at <http://texashelp.tamu.edu/011-disaster-by-stage/pdfs/recovery/ER-032-Disaster-Assistance-Farms-Ranches.pdf>. They cover “up to 100 percent of actual production or physical losses, with a maximum amount of \$500,000.” *Id.* Only landowners with at least \$1000 of fence damage or loss qualify. Micky Wilson, *Heartbreak in the Heartland: Stockpiled Grass, Drought Conditions Fueled Wildfires in Texas Panhandle*, ANGUS J., Aug. 2006, at 176, 176. The amount of aid awarded depends upon the local county FSA office determinations of damage to the fence and on whether the recipient plans to replace or restore the fence. *Id.* Cost sharing also accounts for the age of the damaged fence line; fences older than 30 years old are not eligible for reimbursement. *Id.*

154. TEX. FOREST SERV. TEX. A&M UNIV., READY, SET, GO! YOUR PERSONAL WILDFIRE ACTION PLAN 14 (n.d.), available at <http://texasforestservice.tamu.edu/main/article.aspx?id=14048> (“Firefighters and ranchers in Texas have the same goals when a wildfire occurs—to protect lives, property and livelihoods.”).

155. *Id.*

156. *Id.* (“Offer knowledge of your area to fire crews. Your knowledge of access roads, location of structures, location of water sources, fence lines and geography of the land can prove helpful to fire crews who may not be familiar with the area.”).

157. *Id.* at 13 (“Open/unlock gates so livestock can escape flames. Hook up your stock trailer and load your animals. Close all gates behind horses if they cannot be loaded; they WILL run back into a burning building. Move equipment into a safe zone that is clear of combustible fuels. Close all doors and windows and turn on exterior/interior lights in barns and other structures. Shut off gas supply and propane tanks.”).

158. *Id.* (“If you would like to offer your equipment (water tank, tractor), for firefighting, make arrangements and contracts prior to use for proper tracking and reimbursement.”).

provide information and resources to the firefighters in exchange for superior protection of privately owned assets.¹⁵⁹

On the whole, however, it appears that government agencies have assumed control for managing grassland fires. This result is unexpected, given the homogeneity among ranchers and low transaction costs they face in reaching contractual arrangements. Although the institutional details underlying the lack of contractual arrangements in the Texas grassland context are not wholly understood, this preliminary case study suggests that homogeneity among parties and land uses in addition to low transaction costs do not necessarily result in contractual regimes. Likely, the relative recentness of catastrophic wildfire in the Texas grassland context couples with the fact that landowners do not internalize all the costs associated with wildfire loss to explain this result.

2. Malpai Borderlands Group

Arizona, too, is subject to grassland fires. In the Malpai region of southern Arizona, fires naturally occur between five to ten years, which prevents wood plants, such as mesquite and juniper, from taking hold and reducing grasslands. Nearly a century of wildfire suppression by government wildfire agencies—based on federal land management agency policies—led to the encroachment of woody shrubs at the expense of valued grasslands used for grazing. In 1994, a group of ranchers in Arizona and New Mexico along the US–Mexican border formed an organization designed to coordinate fire management in this high desert landscape’s grassland environment. The resulting group, Malpai Borderlands Group (“Malpai Group”),¹⁶⁰ provides an example of private parties contracting to manage the wildfire resource. The Malpai Group consists of 100 families, with similarly low levels of heterogeneity in landowner type and use, and low transaction costs as those discussed with regard to the Texas example above. The Malpai Group seeks to control the use of wildfire on over 800,000 acres of land. Federal and state land management agencies still own much of the land (around 45%) as a result of the land disposal policies discussed above. Ranchers have leased public grasslands for grazing for nearly a century.

The Malpai Group developed a fire plan to allow natural fires to burn under prescribed conditions—a preventative activity designed to manage the landscape and reduce the risk of catastrophic fire. The Group has burned over 60,000 acres since its formation and plans to burn about 5% to 10% of the grasslands annually. In the process, it was able to work with the relevant

159. *Id.* at 14 (“By offering your knowledge and communicating with fire operations, fire crews can run an operation effectively and efficiently while protecting what is important to you.”).

160. See generally MALPAI BORDERLANDS GROUP, <http://www.malpaiborderlandsgroup.org> (last visited Apr. 21, 2015). On the history of fire in the Malpai, see Bill McDonald, *The Formation and History of the Malpai Borderlands Group*, MALPAI BORDERLANDS GROUP, <http://www.malpaiborderlandsgroup.org/?section=26> (last visited Apr. 21, 2015).

agencies to begin the reintroduction of fire into the region and manage the firescape.

Interestingly, under conditions similar to the Texas example, the Malpai Group relied on contracting to manage the wildfire resource. These contrasting results suggest that the factors we identify as influencing the use of contract are not dispositive. They do, however, indicate the important of institutional detail in understanding the various regimes that arise to manage landscape-level resources.

* * *

Above, we suggested that the extent to which contract is used to manage landscape-level resources may depend upon a low degree of landowner heterogeneity and low transaction costs to contract formation. Our proposal neatly fits some case studies—as with commercial timberland owners in the Pacific Northwest and the Malpai Group of cattle ranchers in Arizona—in which low heterogeneity and low transaction costs correspond to successful contract-based wildfire use and management regimes. In other cases, however, the argument fits less tightly. The Texas cattle ranchers, who seemingly have low degrees of landowner heterogeneity and low private bargaining transaction costs, nonetheless largely fail to contract for wildfire management, and instead rely upon government prevention, suppression, and restoration. Low heterogeneity but high transaction costs, as with the Southern California homes, produces some contracts with third-party private insurers who coordinate prevention and some suppression activities. These findings are discussed below.

V. FINDINGS AND IMPLICATIONS

In Part V.A, we summarize the observations discussed above to provide more generalized observations about the role of contracts in managing landscape-level resources. Part V.B discusses the implications of these findings with regard to future attempts to promote contract as a tool for environmental governance among resource types that do not naturally lend themselves to public–private approaches. It addresses the concern that private contracting may remove skilled and resource-rich resource users from more general pools of resource users, creating undesirable distributional consequences.

A. FINDINGS

We began by questioning how the law influences governance of landscape-level resources. Specifically, we inquired whether: (1) private contracting is capable of providing the organization necessary to manage large landscapes; and (2) the laws influencing private contracts for governing large landscapes. This Part summarizes the observations generated through discussion of various resources.

First, our analysis suggests that private organizations can govern large landscapes without governmental control, but that the factors necessary to promote private contracting are increasingly difficult to maintain because, over time, increased land fragmentation produces increased heterogeneity among landowners and administrative and legal regimes begin, and continue to, overlap. Second, we find that law has shaped the path of ownership by often dividing large-scale resources into fragmented parcels, which describes the conditions under which private organizations control large landscapes. Below, we elaborate on each of these findings and the predictions for the availability for privately ordering landscape-level resources.

1. Capacity of Private Parties to Manage Large Landscapes

Landscape-level resources are often far larger than the individual ownership parcels into which they are broken. With rare exceptions, private land holdings tend to be smaller than the landscape-level resources because the small-scale assets are relatively more valuable. This size discrepancy necessitates coordination among private owners to exert unified landscape control. The absence of unified control leads to wasted resources, as with oil and gas exploitation prior to unitization or uncoordinated fire suppression efforts.

Contracting to control landscapes occurs when two or more landowners coordinate resource management activities. Wildfire suppression and prevention norms among adjacent or nearby private timberland owners are an obvious example of a bottom-up response to managing landscape-level resources. Users often have superior rule-making ability relative to bureaucrats because of their particularized knowledge of their setting and situation.¹⁶¹ The disadvantage to private ordering is contracting costs, which are lowest among a small group of homogeneous landowners.

The costs and complexity of contracting increases not only according to the number of parties who must coordinate to oversee a landscape, but also along the dimension of homogeneity among landowner objectives and desired land uses. When small landowners have differing or conflicting visions for maximizing the value of their property, coordination becomes more difficult. This is typified by a wildland urban interface owner seeking to enjoy the peace and quiet of nature and the timber landowner seeking to extract commercial timber values. Bargaining becomes increasingly time consuming and expensive as the goals and shared norms of the parties diverge.

161. See Hayek, *supra* note 13, at 524; see also Ostrom & Basurto, *supra* note 14, at 319 (explaining resource users who have some independent decision making ability “frequently achieve better economic (as well as more equitable) outcomes than when experts do this for them”); Mario J. Rizzo & Douglas Glen Whitman, *The Knowledge Problem of New Paternalism*, 2009 BYU L. REV. 905, 922–24 (analyzing the ability of individuals to make choices compared with policymakers’ abilities).

As the number of coordinating parties increases, so too does the formality of the governance system. Wildfire protective associations, which operate at state and regional levels, are reflective of this trend. Coordinating can also operate through state governments at the bequest of private landowners, as with state fish and game departments controlling wildlife or the California Department of Forestry and Fire Protection. The case study of private insurers of wildland urban interface users' homes is an example of such a third-party agent. Insurers control the landscape by influencing policyholder behavior to reduce fire risk, consistent with literature on insurers as regulators in other contexts.

These case studies suggest that private contracting provides landowners with benefits in some settings. But, because costs of establishing ownership are often prohibitive, administrative agencies/networks may still generate net gains in other situations. Contracting to control landscape-level resources appears most likely among homogenous owner-types with similar preferences for land uses. Among heterogeneous owners and land uses in which stakeholders exercise power, third-party control mechanisms that incorporate privatized elements—such as third-party private regulators and public-private partnerships—can reduce the transaction costs associated with bargaining and litigation to resolve competing preferences for land use while preserving the flexibility of contracting.

When parties cannot contract efficiently, or there is a government interest in controlling the resource, state or federal control often consolidates landscape governance into a single form that displaces private control. Historically, this governance took the form of government ownership of land, as with National Parks to preserve scenic and geological resources. During the environmental movement of the 1970s, Congress passed statutes enabling federal agency control of some landscape resources, such as endangered wildlife or waters of the United States. The costs, controversy, and administrative difficulties of federal control has caused reversion to more inclusive approaches, as with the public-private partnerships that increasingly define congressional and agency approaches to landscape management in the 2000s.

2. Influence of Law on Landscape Governance

Historical land policies gave rise to fragmented landscapes, creating difficulties for private parties to control large landscape-level resources. Overlapping laws derived from legislative, common law, and regulatory sources served, and continue to serve, to both facilitate and hinder private contracting. Our model allows us to examine how various legal regimes facilitate private contracting.

Colonial-era land policies derived from Roman and English common law were poorly suited to the vast and largely unexplored American landscape. Colonists and western settlers generally ignored or circumvented laws that

failed to fit economically beneficial landscape-governance practices, and instead operated under robust social norms. Norms continue to govern some merchant groups, as with the lobster gangs of Maine or cattle ranchers in Shasta County.¹⁶² Norm-based landscape management preserves relationships, privileges land users' superior knowledge, and produces lower legal costs than government control.

Sometimes, as with western mining practices, the resource exploitation outpaced the Congress's ability to create laws governing landscape management. Custom among miners governed claims. Over time, courts and legislatures adopted and codified these customs, turning private agreements into law. Legal adoption of custom lessened party ability to change practices over time and ossified certain resource uses as privileged.

In situations where the common law failed to adjust to landscape-level assets, state legislatures created doctrines and laws to facilitate private contracting. This is most clearly seen in oil and gas, where compulsory unitization statutes emerged to reduce waste. In groundwater, the common law did adjust in some jurisdictions. Several western states granted private use rights to underground water under the prior appropriation doctrine, providing initial allocations which parties can bargain around.

Laws sometimes displaced norm-based landscape management regimes, as with federal firescape control or the use of antitrust laws to enjoin fishing practices. Laws reducing private contracting for landscape management serve the purpose of consolidating control, which has historic rationales in the fire context particularly as operating under the police powers. Traditional rationales fall short, however, in non-emergency situations, as with fire prevention.

In sum, law sometimes aided and sometimes hindered private contracting of landscape-level resources. The thicket of laws and different outcomes across landscapes is complex. So, too, are the various arrangements of government and private control over landscape management. The table below summarizes the economic and legal characteristics of landscape-level resources.

162. See generally James M. Acheson, *Lobster Trap Limits: A Solution to a Communal Action Problem*, 57 HUM. ORG. 43 (1998) (discussing lobster fishermen's solution to a common-pool resource); Robert C. Ellickson, *Of Coase and Cattle: Dispute Resolution Among Neighbors*, 38 STAN. L. REV. 623 (1986) (describing Shasta County rural landowners' collective efforts to coordinate landscape-level resources).

Figure 3. Economic and Legal Characteristics of Landscape-Level Resources

Resource	Geographic Unit	Legal Tools	Governance Structure
Groundwater	Aquifer	Access laws, state permitting	Open access (Texas), private use rights
Marine Fisheries	Habitat area	Exclusive Economic Zone, antitrust laws	
Oil-Gas	Reservoir	Common law rule of capture, compulsory unitization	Unitization, historic open access
Scenic/Geologic	Geologic structure	Federal land disposal laws	Federal land ownership, conservation easements
Wildfire	Firescape	Government land management laws	Historic cooperative, network of land management and fire suppression agencies
Wildlife	Habitat area	Animal ownership law, state regulations	State agencies, state agreements, private contracting in South Africa

B. IMPLICATIONS

The shortcomings of top-down environmental governance are the source of increasing scholarly discussions.¹⁶³ Enhanced attention to stakeholder participation and new governance approaches has provided new theoretical approaches to age-old resource-use questions.¹⁶⁴ We consider an alternative mechanism for consolidating control of natural resources: private bargaining culminating in contractual arrangements among consenting parties. This inquiry questions the extent to which private bargaining can be used to manage landscape-level resources and the conditions that give rise to contract-based landscape-level resource governance regimes.¹⁶⁵ We explore the legal and economic function of contracting to consolidate control over landscape-level natural resources.

163. E.g., Jens Newig & Oliver Fritsch, *Environmental Governance: Participatory, Multi-Level—and Effective?*, 19 ENVTL. POL'Y GOVERNANCE 197, 209 (2009) (describing how top-down agencies “often choose to delay implementation on substantive grounds or fail to comply due to resource problems”).

164. See generally Bradshaw Schulz, *supra* note 5.

165. We adopt a narrow definition of “success” in contracting for this project, studying only the extent to which contracting allows stable consolidation of control over a resource. We, of course, acknowledge that the larger definition of success in any natural resources regime is much broader and more complex than mere control over a resource.

This Essay represents the first step in establishing a theoretical framework for future projects across resource types. The role of contracting to assemble resource-scale management regimes is vast and includes settings as varied as beachfronts along the Eastern Seaboard to avalanche paths in the Swiss Alps. There are also open questions about the extent to which contracting is used to negotiate competing resource uses overlaying the same landscape, as with wildlife affecting mining or recreational snowmobiling competing with conservation, wildlife, or preservation claims. More broadly, the contracting framework speaks to broad, ongoing themes of landscape-level conservation and public-private partnerships.

The case studies outlined above provide a starting point for ongoing questions regarding the role of contract in resource management. For example, does the uneven use of foam retardant on houses, used by high-net-worth individuals to protect high-value homes, divert the attention of the most resource-rich individuals away from communal fire protection strategies?¹⁶⁶ Do the lessons garnered from our examples, wildfire particularly, extend to other resource types? Do domestic accounts of contracting for control of resources correspond with international attempts to manage and conserve resources?

Most notably, we caution that the existence of contract ought not be conflated with the success of contract.¹⁶⁷ This is to say that we provide only a first step in an ongoing project to understand the desirability of contractual control over landscapes. Defining the metrics of success for landscape management is a far larger scholarly discussion, as is the ongoing consideration of the normative desirability of public-private approaches relative to alternative mechanisms for control.

VI. CONCLUSION

We consider the role of contract, a subset of public-private approaches, to governing landscape-level resources. We specifically examine how laws affect the process of contracting for resources with a scope exceeding individual property boundaries. We note that historical land policies gave rise to fragmented landscapes that create problems of controlling larger, landscape-level resources. Overlapping laws derived from legislative, common law, and regulatory sources served to both facilitate and hinder private contracting. We examine the extent to which various legal regimes facilitate private contracting in the examples of wildfire, wildlife, marine fisheries,

166. We are indebted to Lee Fennell for raising this point.

167. 4FRI provides perhaps the best example of the existence of a contractual regime that suffers from tremendous public criticism, showing that the existence of a contract cannot be conflated with the success of contracting to manage the resource. *See generally* Claudine LoMonaco, *Up in Smoke: Is the US Forest Service Killing the Last Best Chance to Save the Southwest's Forests?*, SANTA FE REP. (June 25, 2013, 12:00 AM), <http://www.sfreporter.com/santafe/article-7515-up-in-smoke.html>.

underground resources, and scenic landscapes. We find that there are examples of private contracting, the emergence and continuance of which are based upon homogeneity of landowner types and uses. Law affects the governance regimes that emerge and may hinder or facilitate bargaining to control resources, depending upon resource type and value.